Oceanographic Features of the Beaufort Sea in Early Winter

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by

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ABSTRACT

H. Melling. Oceanographic Features of the Beaufort Sea in Early Winter. Can. Tech. Rep. Hydrogr. Ocean Sci. 5: 131 pp.

Oceanographic data were acquired over an area of 150,000 km^2 in the southeastern Beaufort Sea during November 1979 in conjunction with the Beaufort Sea Winter Ice Experiment. Hydrographic profiling by CTD probe enabled delineation of the dynamic topography of the region and identification and tracing of the principal water masses. Baroclinic shear was directed southwestward along bathymetric contours, with a jet of 10 cm/s (0/300 db) overlying the continental slope. Outflow from Amundsen Gulf was evident. Measured flow at mid-depth on the shelf was easterly in the mean, while the baroclinic shear implied weaker surface flow. Observed intrusions of near freezing water over the slopes pointed to important exchanges of water between the shelf and the basin. The existence on the shelf of suitably saline water for these intrusions was confirmed and is indicative of the importance of freezing and ice-cover divergence in Arctic oceanography.

Key words: oceanography, Beaufort Sea, hydrography, currents, freezing.

RESUME

H. Melling. Oceanographic Features of the Beaufort Sea in Early Winter. Can. Tech. Rep. Hydrogr. Ocean Sci. 5: 131 pp.

Les données océanographiques ont été recueillies sur une superficie de 150 000 km^2 dans le sud-est de la mer de Beaufort en novembre 1979, de concert avec l'Expérience sur la glace d'hiver dans la mer de Beaufort. La détermination du profil hydrographique à l'aide d'une sonde CTP a rendu possible la délimitation de la topographie dynamique de la région ainsi que l'identification et le traçage des principales masses aqueuses. Le cisaillement barocliniqne, orienté vers le sud-ouest le long des courbes bathymétriques, était accompagné d'un courant jet de 10 cm/s (0/300 db) au-dessus du talus continental. De plus, un écoulement provenant du golfe d'Amundsen a été observé. En moyenne, le courant dans les eaux mitoyennes au-dessus de la plate-forme se dirigeait vers l'est pendent que le cisaillement baroclinique laissait supposer un courant plus faible à la surface. Des intrusions d'eau près du point de congélation observees au-dessus des pentes indiquaient des échanges important d'eau entre la plate-forme et le bassin. La présence sur la plate-forme d'eau assez saline pour composer ces intrusions a été confirmée et dénote l'importance des variations du gel et de la couverture de glace pour l'océanographie de l'Arctique.

Mots-clés: océanographie, la mer de Beaufort, hydrographie, courants, gel.

1. INTRODUCTION

During November and December of 1979, a field study was conducted in the southeastern Beaufort Sea with the objective of obtaining data sets suitable for the development and testing of numerical models of sea-ice drift. Participants in the joint study were the Atmospheric Environment Service, Canada (meteorological and ice reconnaissance branches), Ocean Science and Surveys, Canada (Frozen Sea Research Group), Canada Centre for Remote Sensing, Dome Petroleum, Ltd. (Environmental Research Group) and Intera Environmental Consultants, Ltd. (remote sensing). The overall project title was WIEBS-1: "Winter Ice Experiment-Beaufort Sea, 1". This report summarizes the oceanographic component of the co-operative project, principally the responsibility of the Frozen Sea Research Group. Information on other aspects of the study and on modelling efforts may be found in Intera (1980, 1981a, 1981b) and Neralla et al. (1981).

The oceanographic objectives were a quasi-synoptic determination of flow at the base of the oceanic Ekman layer over the domain of the numerical models, and the acquisition of some measure of oceanic flow variability at this level both with position and in time.

A map of the study area is shown in Figure 1 with the model and observational domains and approximate bathymetry superimposed. The area lies on the southeastern margin of the Canadian Basin of the Arctic Ocean. Maximum water depth in the area depicted is about 3700m (near the northern corner). A rapid decrease in depth to values in the range 100-200m occurs at the edge of the continental shelf marked in Figure 1. The shelves north of Tuktoyaktuk and west of Banks Island are broad (150 km) and shallow (average depth ~50m). The shelves are joined by a ridge across the mouth of Amundsen Gulf west of Sachs Harbour which ascends to depths of about 370m. Maximum depths in the Gulf exceed 600m. Herschel Canyon, near 138°W brings the shelf edge within a few kilometres of shore and isolates the region north of Tuktoyaktuk from the narrower Alaskan shelf to the west.

There is considerable activity associated with offshore petroleum exploration on the shelf between Herschel Canyon and Amundsen Gulf. The hazard posed by drifting ice to this activity was a major motivation for the Winter Ice Experiment.

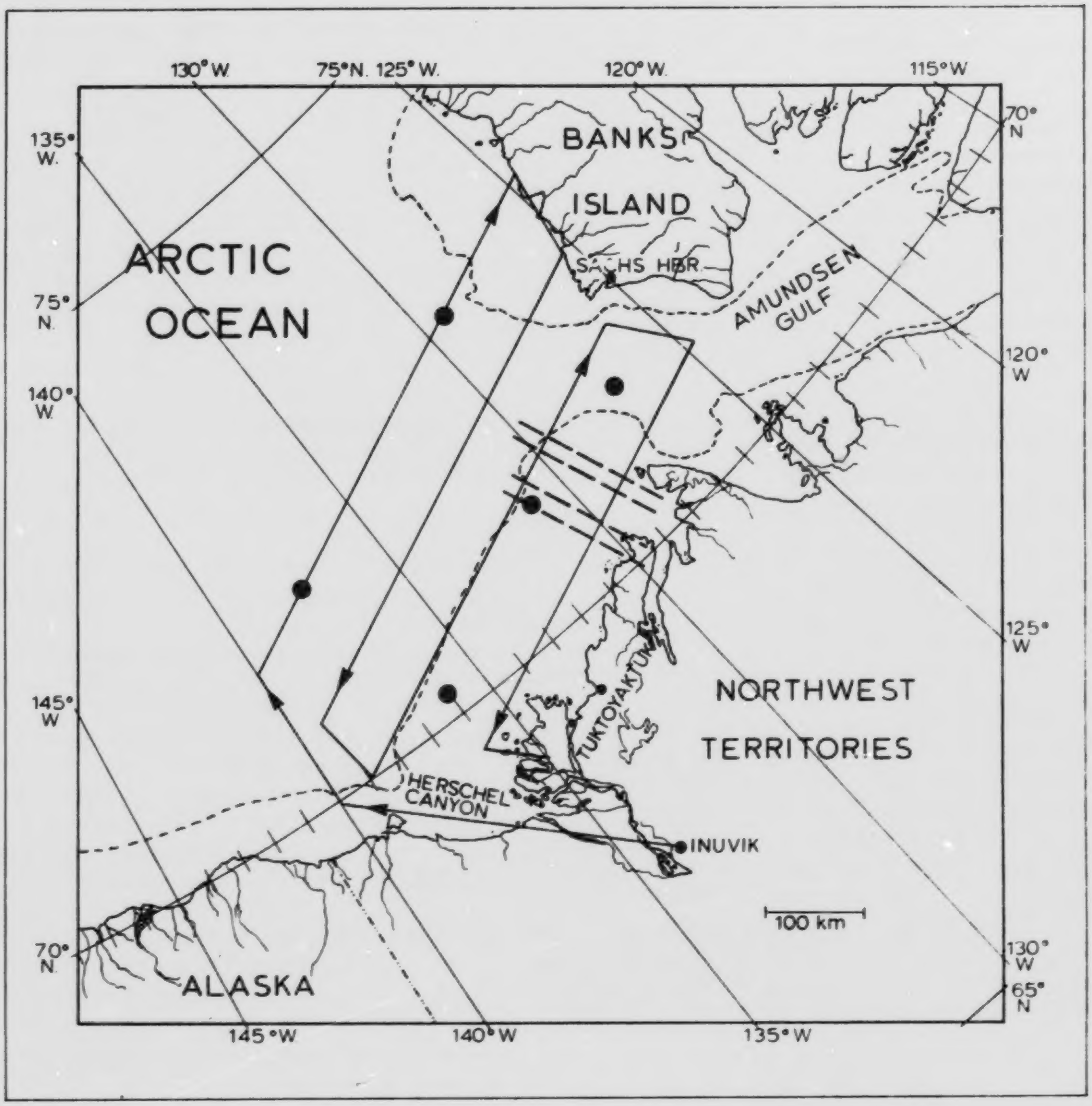

Figure 1. Study area for WIEBS-1. The dashed line marks the edge of the continental shelf. Solid dots shows the deployed positions of drifting platforms. The solid line with arrows is the track flown from SLAR coverage, while the short line pairs are tracks for SAR coverage. Oceanographic data were acquired within the area of SLAR coverage, which is also the domain of the Intera ice-drift model. The domain of the AES model is the entire area shown.

2. OBSERVATIONAL PROGRAMME

The oceanic flow at the base of the Ekman layer may be viewed as the sum of a relatively steady (over 10-100 days) baroclinic component which can be calculated, subject to assumptions of geostrophy, from profile measurements of temperature and salinity over the study area, and a barotropic component, incorporating most of the short-period variability (0.5 - 10 days), which must be measured directly. Oceanographic observations made during WIEBS-1 were directed at the determination of both components.

Profiles of temperature and salinity against pressure were obtained to a depth of 400m at 12 locations between 24 and 30 November (Table 1 and Figure 2). A lightweight oceanographic winch suitable for aircraft transport was used to deploy the CTD probe beneath the sea ice cover. This winch is described by Brooks (1977). The CTD probes were Guildline digital models (No. 8706). Some information and field calibration data for these probes are listed in Table 2. In-situ calibration of the pressure transducer for varying offset was routinely carried out at a measured depth of 3m, while sensitivity was assumed unchanged from laboratory calibration. Temperature calibration for offset was performed at about the same depth (where T~-1.7°C) using as a transfer standard a pair of precision (± 0.001°C) thermistors taped adjacent to the temperature sensor. The laboratory value for offset variation with temperature was used and calibration was assumed to be independent of pressure. Calibration of the conductivity cell was based on the salinities of water samples acquired both in the surface mixed layer (S~31) and near 400db (S~35) and on calibrated temperatures and pressures. Samples were stored in sealed glass bottles and transported unfrozen to Victoria where their salinities were determined using a Guildline Autosal 8400 salinometer. The conductivity ratios measured by the probe were corrected for the effect of temperature and pressure on the dimensions of the conductivity cell.

As an error detection measure, two passes were made down each profile using a first-difference discriminator to identify possible spikes. Those identified were then examined subjectively to determine if the suspect observation should be replaced by an interpolated value. Error rates were very low. Before computation of salinity from the measured data, the procedures outlined by Perkin and Lewis (1982) were followed to correct for the different response characteristics of the temperature and conductivity sensors on the probe.

Salinities were calculated from measured parameters using the Practical Salinity Scale, 1978 (Lewis, 1980) and are quoted without units. Density computations were based on Millero et al. (1980) and Millero and Poisson (1981) and calculations of freezing temperatue on Millero (1978).

Transport to measurement locations presented formidable problems. Aircraft were the only suitable vehicles, but at this time of year in the Beaufort Sea there is sufficient light for aircraft landings on sea ice for only 1-2 hours per day (i.e. for only 1 CTD location per day). A round-trip range of about 800 km from Tuktoyaktuk to the most distant sites necessitated at least some use of a fixed-wing aircraft, while the dangerously thin ice in the southern part of the study area (less than the 18 inches required for a Twin Otter DHC6) dictated the use of a helicopter. Because it was the only

Table 1: Location of CTD Observations

Station	Latitude	Longitude	Depth(m)	Pressure(db)	Ice(m)	Profiles
1	70°50.0'	131°00.0'	47	1- 47	0.33	3
2	72°54.0'	128°53.0'	500†	2-411	0.50	1
3	72°10.0'	132°30.0'	1600†	2-407	0.55	2
3'	72°13.6'	132°44.7'	1600†	2-410	0.57	2
4	71°50.0'	137°15.0'	2200†	3-409	0.40	1
5	70°07.9'	135°37.5'	43	1- 43	0.35	3
6	71'06.6'	126°40.6'	290	2-293	0.85*	1
7	72°00.0'	127°20.0'	370	2-372	0.60*	1
8	71°25.0'	133°30.0'	1000†	2-411	0.60*	1
9	71°37.1'	130°22.4'	600†	2-406	0.38	1
10	73°01.0'	134°52.0'	2600†	2-408	0.55	1
11	71°00.0'	136°30.0'	1100†	2-407	0.35	1
12	70°25.0'	139°00.0'	900†	3-406	0.40	1

* Rafted ice
† Depth estimated from chart

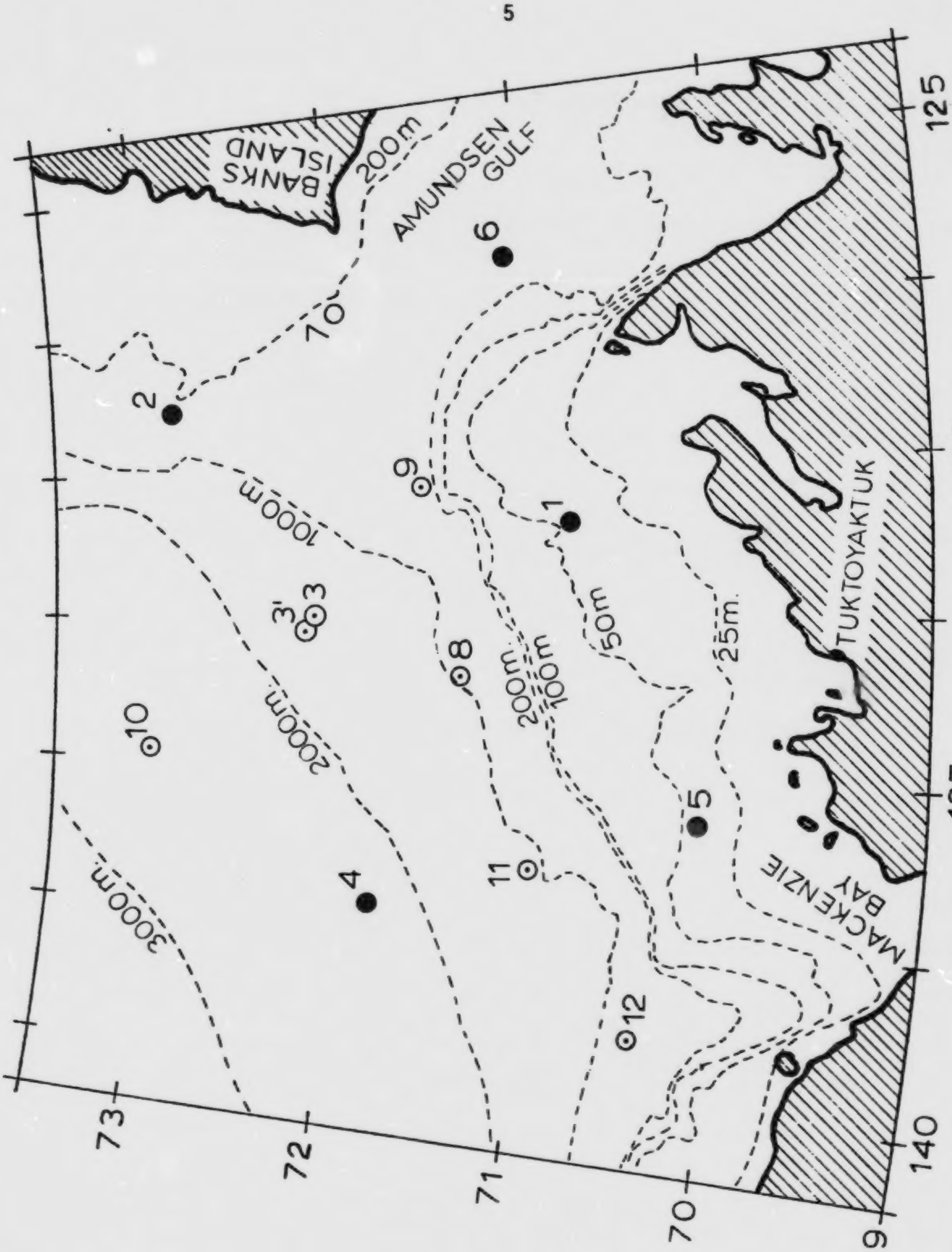

Figure 2. Locations visited during oceanographic studies in 1979. A solid symbol indicates that a satellite platform was deployed at the site. The platform at location 1 measured ocean current at 18m.

TABLE 2: CTD Probe Characteristics

Bayfield Probe (CCIW)
Useage : Exp. 1-10, 12-19.

	Pressure (400db)	Temperature	Conductivity Ratio	[Salinity]
Serial#	273 077	42 200	43 601	
Offset	0.0db	+.005°C	0.0	[-.018]
Slope	1.0	1.0	0.99949	[1.0]
Accuracy	±max(0.3db,.2%)	±.005°C	±0.00017	[±.01]
Precision	±0.1%	±.001°C	±0.00003	[±.001]
Reference	Deadweight Tester & In-Situ Offsets	5 lab. & In-Situ calibrations	8 In-Situ bottles	

Probe 42306 (FSRG #4)
Useage : Exp. 11 only.

	Pressure (2500db)	Temperature	Conductivity Ratio	[Salinity]
Serial #	144 477	44 494	41 671	
Offset	-2.8db	0.000°C	0.0	[+.013]
Slope	1.0	1.0	1.00039	[1.0]
Accuracy	±max(0.3db,.2%)	±0.005°C	±.0002	[±.01]
Precision	±0.1%	±0.001°C	±.00005	[±.001]
Reference	Deadweight Tester & In-Situ Offsets	Calibrated data from Bayfield Probe	Calibrated data from Bayfield Probe	

suitable machine available in the area, an IFR-equipped Sikorsky S61 was utilized for visits to the southern sites, while a Twin Otter accompanied by a Cessna 185 was flown to the northern locations. The lightweight Cessna was used to identify sites where the ice thickness was suitable for Twin Otter landing while the Twin Otter provided navigational support for the Cessna. Profile locations were determined by VLF/Omega navigation using Ontrac on the helicopter and GNS-500A on the Twin Otter. Position uncertainty is + 2 km, (Mortimer and Milner, 1980).

Several precautions were necessary during use of the CTD probe in the open. At the sub-freezing air temperatures encountered, chilling of the probe was likely and an icing of the sensors possible following their immersion in cold seawater. After each use, the conductivity cell was filled with alcohol to remove ice and prevent drying of the electrodes. The probe was warmed during flight using the aircraft heating ducts and deployment of the probe through the ice was as rapid as possible. Similar procedures were followed for the Knudsen sample bottles. These steps eliminated the problems associated with heavy icing on cold sensors following immersion in water at freezing temperature. However, vigourous movement of the probe after immersion and occasionally recovery of the probe to allow brushing of the conductivity cell were still necessary to remove adhering ice crystals. Despite these precautions two profiles (Exp. 8 and Exp. 11) show the effect (an apparently reduced salinity near the surface) of ice in the cell which is dislodged as the cell flushes during descent. Following immersion, the probe was left powered for 5-10 minutes to allow equilibration of the electronics. Sensor outputs changed significantly during this period.

Direct current measurements were the responsibility of Dome Petroleum as part of their drifting buoy program. Six buoys manufactured by Bristol Aerospace and tracked using the ARGOS Doppler navigation system aboard the TIROS-N satellite were deployed at locations 1-6 in Figure 2. All buoys measured air pressure and temperature and those at locations 1 and 3 measured in addition currents at 18m (60 feet) using a modified Aanderaa current meter deployed on an aluminum pipe. The pipe provided a directional reference relative to the ice while vane orientation relative to the meter and buoy orientation relative to magnetic north were both measured. Accuracies of the measured currents are + 2 cm/s in speed and ± 5° in direction. Currents relative to an absolute reference frame were determined by filtering sequences of buoy position and of current displacement (progressive vector map) relative to the ice using Kalman filters (Thorndike and Cheung, 1977) with matched frequency response*. Subtraction of the vector velocity outputs of the filters produced ocean-current vectors for a mixed (due to buoy motion) time/space co-ordinate. Uncertainties in buoy motion are ± 2 cm/s in each component for motions with period greater than about 1.5 days. Thus ocean currents are uncertain by ± 3 cm/s in this range of periods. Unfortunately, the buoy at location 3 failed shortly after deployment and no current data were obtained from it.

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* For buoy motion, $Q = 100m^2h^{-6}$ & $R = 1000m$;
For relative current, $Q = 100m^2h^{-6}$ & $R = 150m$.

The CTD and current-meter data are supplied in Appendices 1 & 2. Other data of oceanographic relevance which were acquired are:

i) Thickness of sea ice at landing sites (Table 1). These data should be treated exactly as this, since requirements for aircraft landing favour thick, smooth, first-year ice.

ii) Snow cover thickness and air-snow, snow-ice and ice-water interface temperatures. These data were acquired at 11 sites with 1-6 determinations per site (Appendix 4).

iii) Ice drift from satellite tracking of buoys (Appendix 3). Detailed drift maps over short periods were also obtained from airborne radar data (Intera, 1981b).

iv) Ice pack characterization in terms of the fractional coverage of leads, first-year ice, multi-year ice, rubbled ice and land fast ice and in terms of mean thickness and compactness. These analyses were based on SLAR data (Intera, 1981b).

3. INTERPRETATION OF OBSERVATIONS

3.1 Dynamic Topography

The dynamical method for computing the shear in a baroclinic ocean is reviewed by Fomin (1964). The actual current at any point will be the vector sum of the baroclinic shear, the barotropic geostrophic flow resulting from sea-surface slope and various ageostrophic and time-dependent terms. It is generally assumed that the latter are small at non-tidal periods, and that the ageostrophic currents are notable only in the frictional boundary layers. The barotropic component may be comparable to the baroclinic shear.

The baroclinic current profile for 3 profile pairs is plotted in Figure 3. The reference level is 400db. Pair C is centred over the 2200m isobath, pair B over the 1800m isobath and pair A over the 1000m isobath. The vertical shear is seen to increase markedly with the decreasing depth and steepening bathymetry on the continental slope. The bulk of the shear is confined to the upper 300 db.

Contour maps of dynamic height anomaly on a given pressure surface illustrate the vector field of baroclinic flow on that surface. Figures 4a, 4b, 4c depict such contours for 0db re 300db, 125db re 300db and 0db re 45db respectively. The reference level of 300db lies in the upper part of the Atlantic water mass which probably moves at less than 3cm/s in an anticyclonic sense in this region (Coachman and Barnes, 1963; Kusonoki, 1962). Due to the scarcity of observations, some subjectivity was involved in contouring the data. Station separation averages about 100km, whereas over the continental slope the topographic length scale, H/α, is only 20km (H is the water depth; α is the bottom slope) and the internal Rossby radius, $\sqrt{(g'h)}/f$, is only 10km (g' is reduced gravity; h is upper layer thickness; f is the Coriolis parameter).

Features to note in Figure 4 are:

i) The surface (0db) flow is southwesterly and shows a strong tendency to follow bathymetric contours.

ii) The subsurface flow (125db) is similar to the surface flow except that it has half the magnitude, and it converges slightly on the shelf edge and intensifies towards the west.

iii) The shear in the surface layer (0/45db) is westerly and weak except on the northeast corner of the Mackenzie shelf where values over 5 cm/s are encountered.

iv) There are indications of flow out of Amundsen Gulf both in the surface and subsurface layers. Within the surface layer (0/45db), an intrusion of the Beaufort gyre into Amundsen Gulf is suggested.

v) The flow is intensified 2-3 times over the continental slope relative to values over the Canada Basin (4cm/s). The actual intensification may be narrower and stronger than depicted in Figure 4, which is based on data with poor spatial resolution.

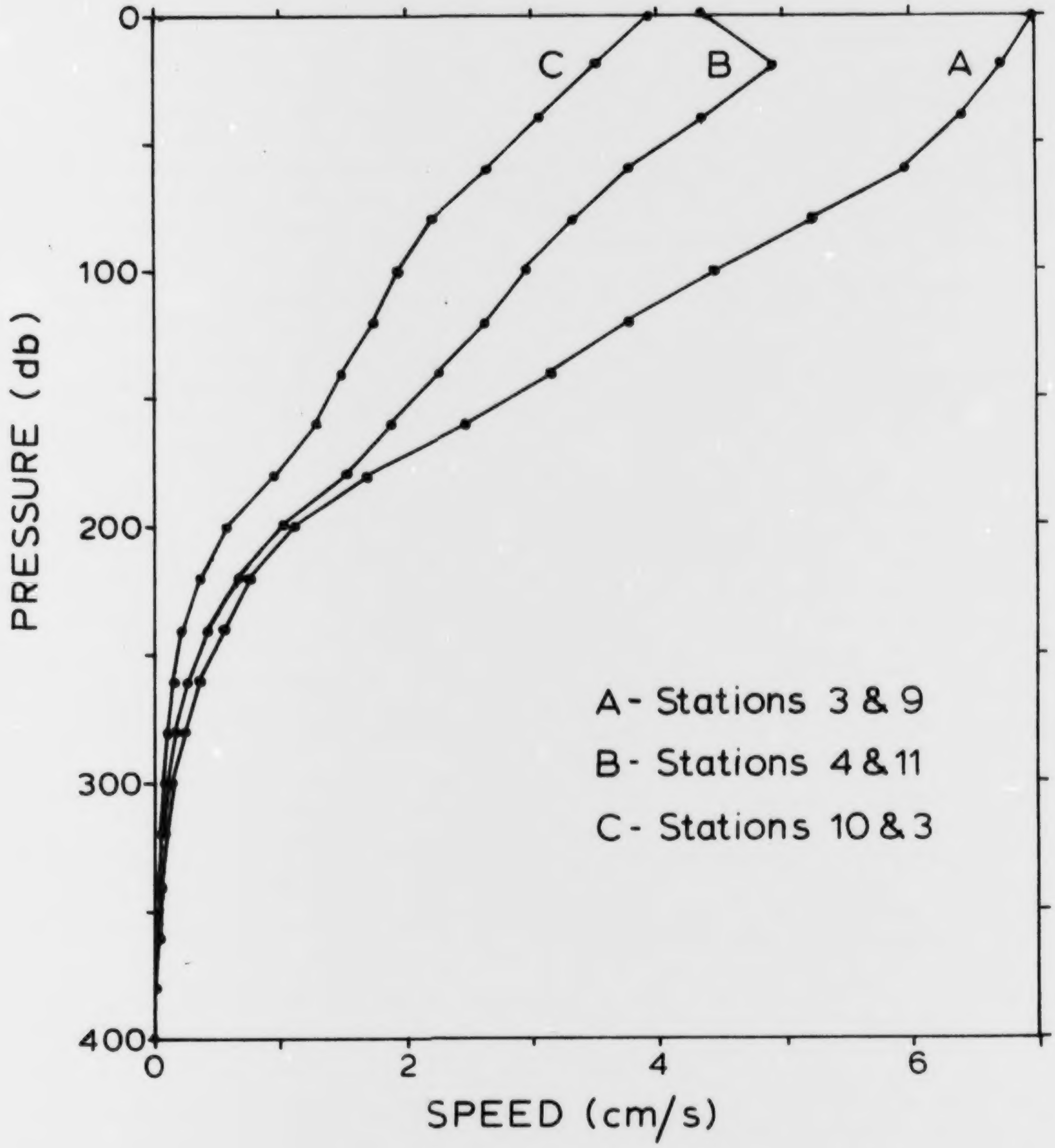


Figure 3. Profile of baroclinic current relative to 400 db for 3 pairs of hydrographic stations.

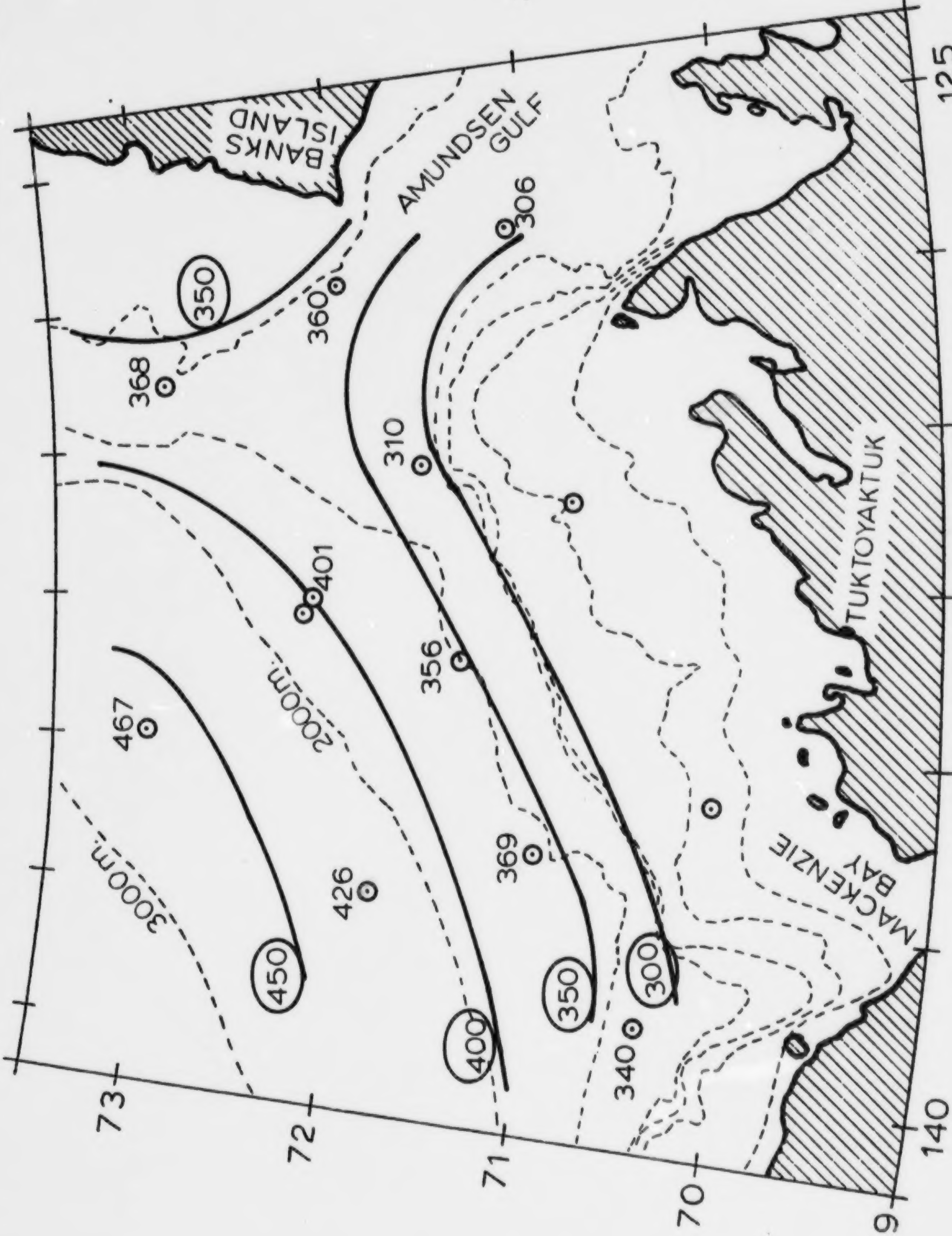


Figure 4a. Dynamic topography (dyn.mm) of the 0db level relative to 300 db, illustrating the baroclinic flow of the Arctic Surface layer. A contour separation of 1° of latitude implies U $\sim$ 3.3 cm/s.

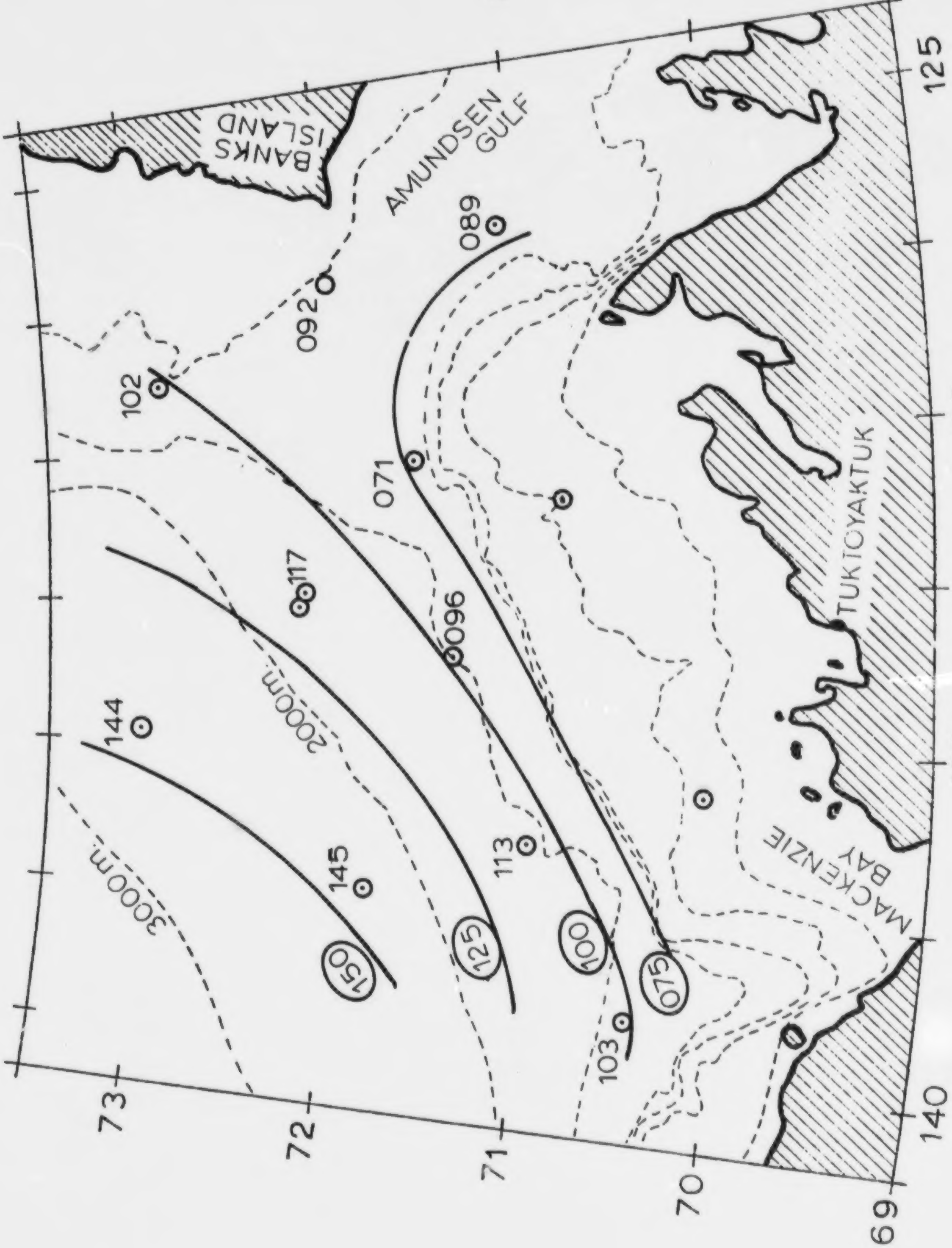


Figure 4b. Dynamic topography (dyn.mm) of the 125 db level relative to 300 db, illustrating the baroclinic flow near the centre of the Arctic Subsurface layer. A contour separation of 1° of latitude implies U ~ 1.6 cm/s.

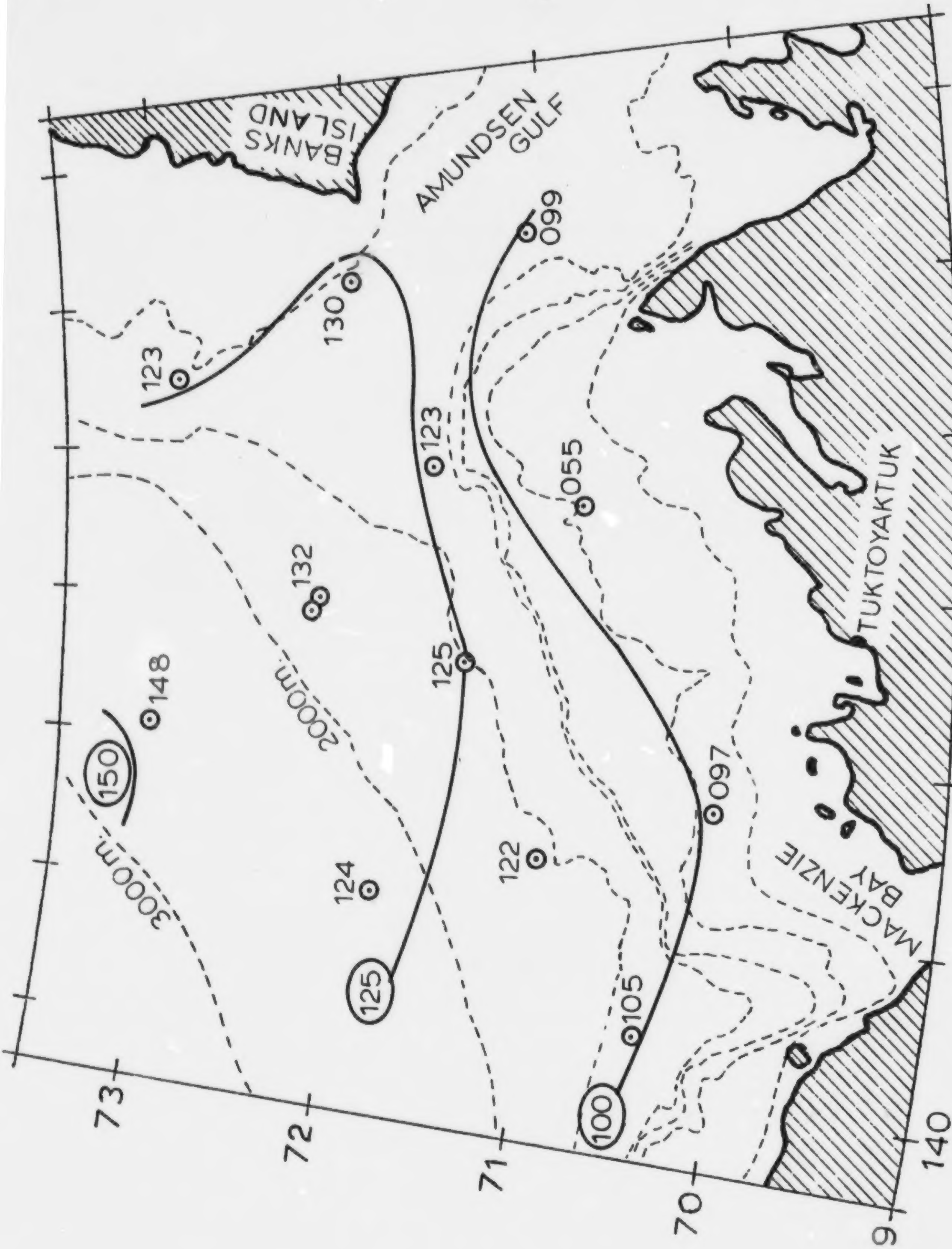


Figure 4c. Dynamic topography (dyn.mm) of the 0db level relative to 45 db, illustrating baroclinic shear within the Arctic Surface layer. A contour separation of 1° of latitude implies U ∿ 1.6 cm/s.

The southwesterly surface flow in the area is well-known from studies of drifting ice and previous dynamic topographies (Coachman and Aagaard, 1974). Modelling studies indicate that it is primarily wind-driven (Galt, 1973; Semtner, 1976). The existence of a baroclinic jet over the continental slope, parallelling bathymetric contours, is a consequence of the Ekman transport in this circulation (Csanady, 1973; Lill, 1979). Offshore fluxes in the Ekman layer must be balanced by a shoreward flow in the remainder of the water column. With decreasing water depth over the continental slope, the shoreward current increases to maintain continuity. Because the Ekman flux across the slope is constant relative to the (shoreward moving) lower layer, the offshore drift increases seaward. The resulting divergent surface flow drives an upwelling over the slope.

The westerly shear in the surface layer is a consequence of the peripheral uptilting of isohaline surfaces in the wind-driven gyre. This uptilting is augmented by the salinization of shelf waters during ice formation (see Section 3.2). The dense shelf water so formed is stabilized by rotation against offshore drainage, and flows instead to the northeast. The consequent development of an oceanic front at the shelf break is suggested by the enhanced shear near 71°20'N, 130°00'W in Figure 4c.

The flow out of Amundsen Gulf is not well enough resolved to suggest a cause (or to apply concepts of continuity). The differing T-S characteristics at stations 7 & 6 (see Section 3.2) argue against a short-lived intrusion of Arctic Ocean water into the gulf, except perhaps in the surface layer.

Baroclinic current vectors for the surface (0db) relative to 400db are tabulated in Appendix 5 and depicted in Figure A5-1 for a regular grid of positions.

3.2 Water Masses and Inferred Circulation

The uppermost 1000m of the Arctic Ocean is traditionally described in 3 layers. The upper 5-50m, the Arctic Surface layer, is directly influenced by atmospheric forcing and well-mixed by turbulent processes. In winter this layer is very close to freezing temperature. Below the well-mixed zone and above the 0°C isotherm is the Arctic Subsurface layer. This layer encompasses the bulk of the pycnocline and its properties are maintained by horizontal advection of water from peripheral seas. Arctic shelf seas in winter provide the near-freezing source water which dominates this layer (Aagaard et al., 1981; Melling and Lewis, 1982), while the Bering Sea in summer contributes a warmer subsurface intrusion (Coachman and Barnes, 1961). The Atlantic water lies beneath the 0°C isotherm and in the study area has a maximum temperature approaching 0.5°C.

3.2.1 Atlantic Water

In this study the maximum depth of observation (400db) lay above the usual depth of the temperature maximum in the Atlantic water of this area (0.42°C at 475db; Coachman and Aagaard, 1974). However at the two locations immediately west of Banks Island local maxima in temperature were actually observed (0.332°C at Station 2 and 0.259°C at Station 7) near 360db. The low temperatures at these maxima, and the presence of temperature finestructure on the profile at Station 2 suggest an interaction in this area of Atlantic Water with a cooler water of salinity 34.84 - 34.85 perhaps originating in Amundsen Gulf where deeper waters are partially isolated from the Arctic basin and may lose heat to overlying layers during their residence in the gulf.

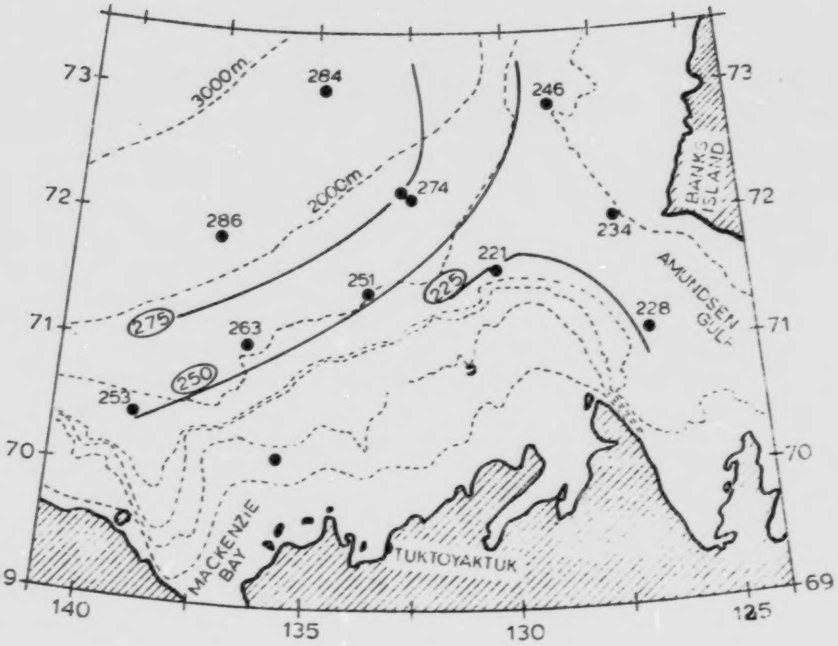
Figure 5a illustrates the depth of the 0°C isothermal surface which is the upper boundary of the Atlantic water. As a consequence of baroclinic adjustment, the surface rises to about 225db over the continental slope. Upwelling to depths found on the outer shelf (100m) was not observed, although spatial sampling was hardly suited to its detection. Aagaard et al., (1981) report upwelling near 150°W on the Alaskan coast which occurred during November 1976. In this event the 0°C surface sloped upward from 200m to 100m in about 16 km. Because the minimum cross-slope spacing of stations in the present study was about 50 km, a similar upwelling of Atlantic water onto the Mackenzie shelf in November 1979 cannot be ruled out. The overall topography of the 0°C surface in the Arctic Ocean (Figure 5b) is consistent with the present observations. The 0°C surface in the southeastern Beaufort Sea is also an isopycnal surface. The mean value of σ_t at 0°C is 27.821, with a standard deviation of 0.006.

At greater depths in the Atlantic water there is a systematic variation in T-S relationship over the area. The temperature on the surface with salinity 34.8 was chosen as a measure of this variability as it was the largest salinity detectable at all deep-water observation sites and occurs just above sill depth in Amundsen Gulf. Figure 6 depicts this parameter, which varies by 0.13°C from east to west in the study area. Lowest values are found in Amundsen Gulf. The contoured data are suggestive of a flow of colder water out from Amundsen Gulf and west along the continental slope. Since the surface with salinity 34.8 lies at about 350db and below the level of baroclinic shear, Figure 6 is indicative of a mean barotropic flow in the same direction as the baroclinic shear.

3.2.2 Arctic Subsurface Water

The variable character of Arctic Subsurface water is illustrated by profiles in Figure 7. Profile a is representative of the basin of the Beaufort Sea, profile d of Amundsen Gulf and profiles b and c of the slopes of the Mackenzie and Banks Island shelves, respectively. Distinct maxima in temperature are found above 100m both in the Canada Basin and within Amundsen Gulf. Over the continental slopes "ragged" temperature profiles are indicative of an interleaving of near-freezing water which apparently displaces the local maxima in temperature which might otherwise be present there.

Figure 8 is a map of minimum temperatures observed in the Arctic Subsurface water. Lowest values are found near and on the shelves. A similar distribution has been observed in the Arctic Ocean as a whole (Treshnikov et al., 1972). Since freezing-temperature water of salinity 33.7 was observed on the Mackenzie shelf in November 1979, the shelves are plausible sources for the cold-water intrusions over the slopes. Further discussion of these observations in the context of this phenomenon may be found in Melling and Lewis (1982). The phenomenon is of considerable thermo-dynamical significance in the Arctic Ocean, since it permits the Atlantic water to lose heat upward to the atmosphere without melting the ice



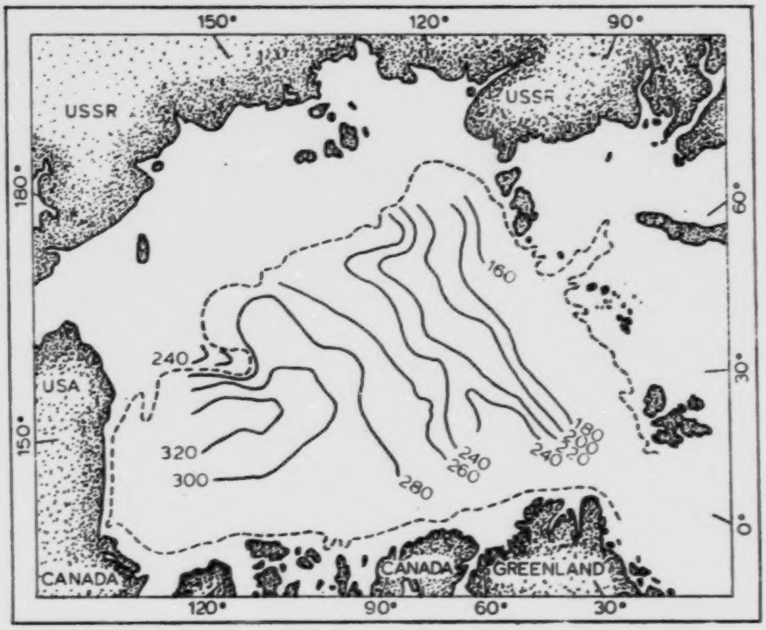


Figure 5a. Pressures (db) on the 0°C surface. This surface is traditionally identified as the upper boundary of the Atlantic water.

5b. Depth (m) of the 0°C surface in the Arctic basin based on Soviet data (from Treshnikov and Baranov, 1972).

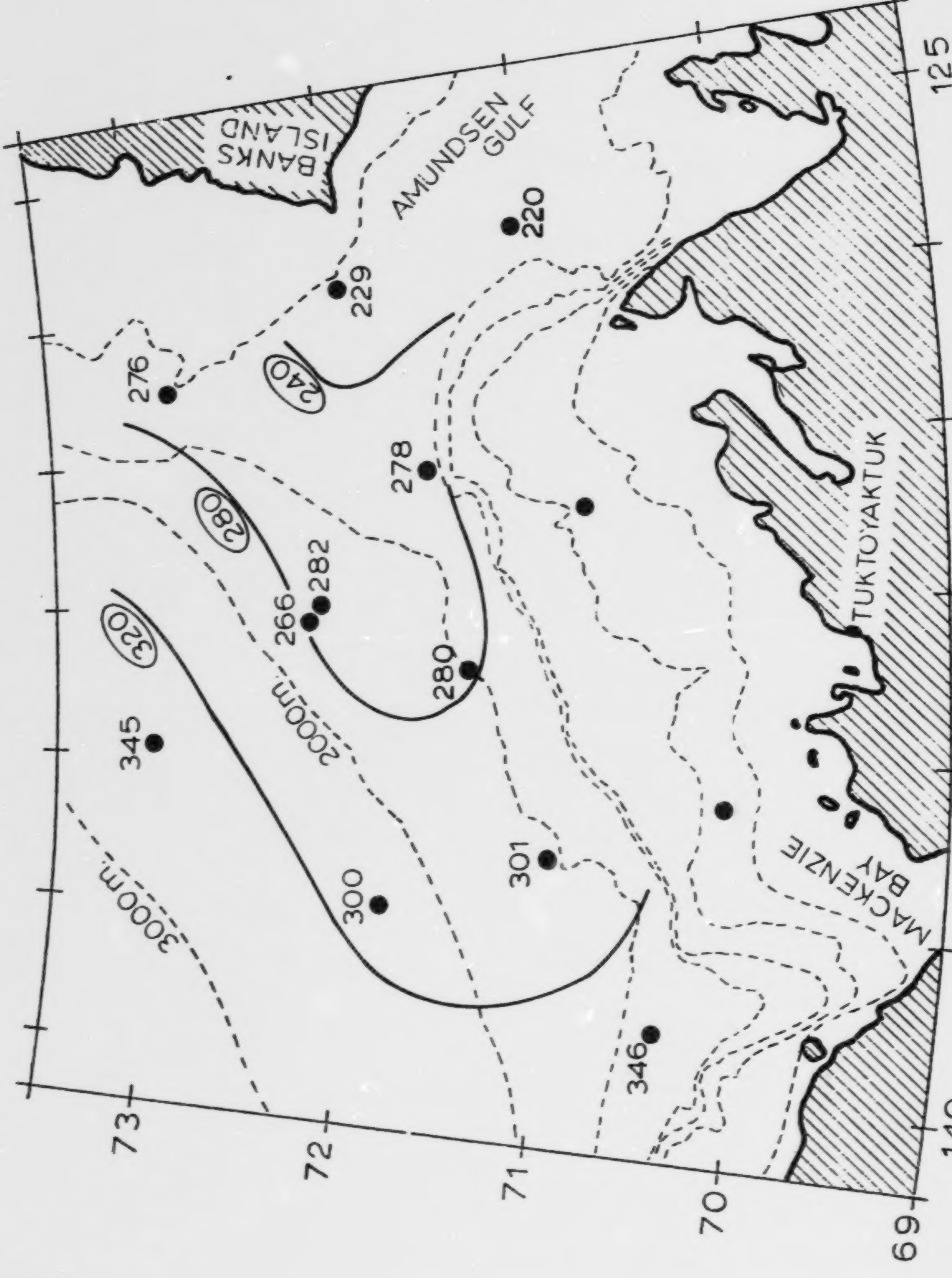


Figure 6. Temperature (°C*1000) on the surface with salinity 34.8. The map illustrates systematic variation in T-S relationship in the Atlantic water.

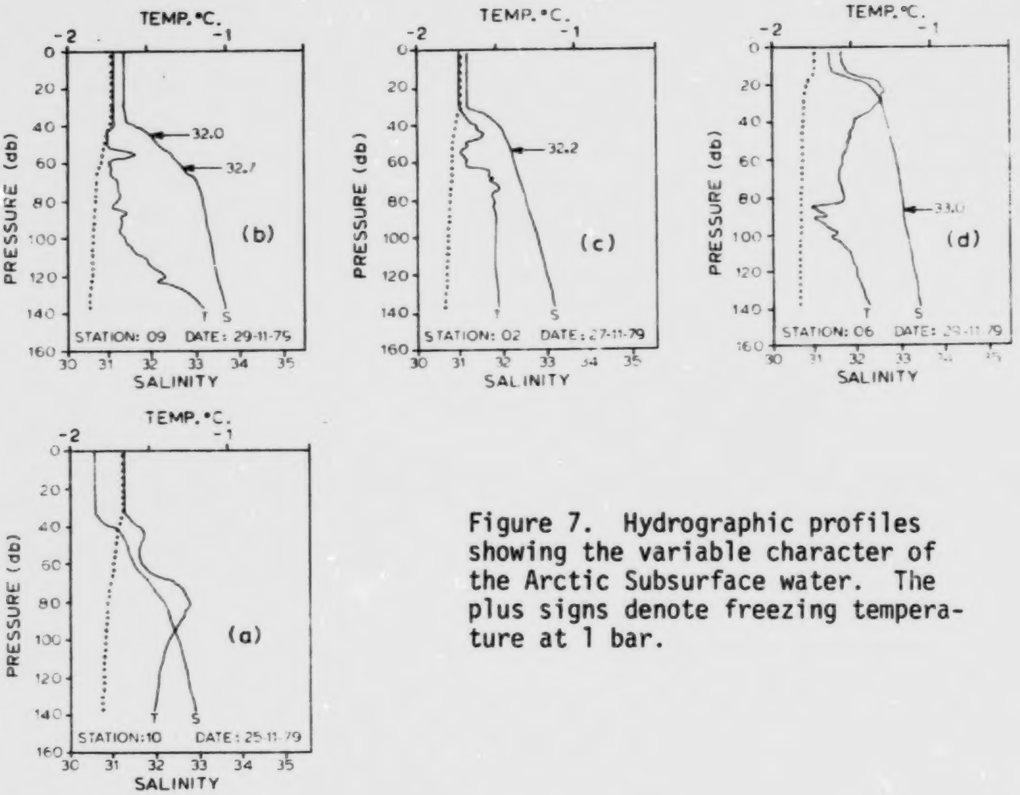


Figure 7. Hydrographic profiles showing the variable character of the Arctic Subsurface water. The plus signs denote freezing temperature at 1 bar.

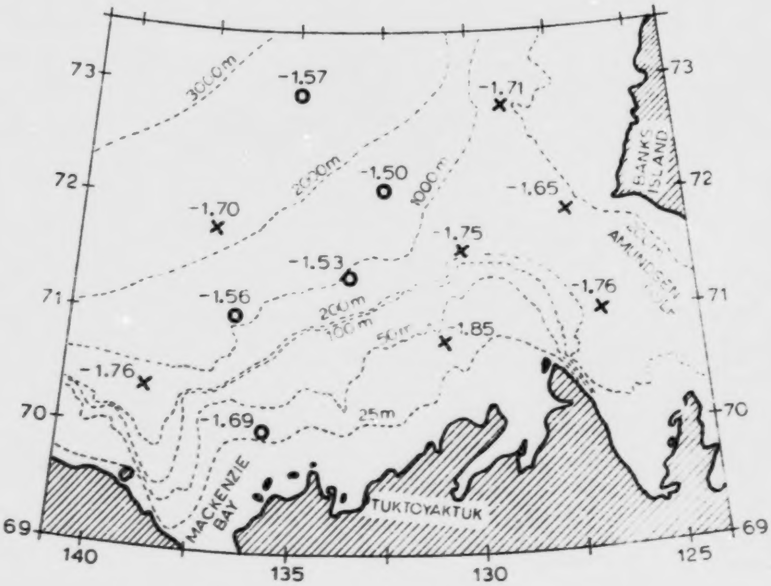


Figure 8. Minimum temperatures observed in the Arctic Subsurface water. An 'x' indicates that the minimum occurs at an interleaved feature or in potential source water for such a feature.

cover. In the process, certain shelf areas (the southeastern Beaufort Sea is one such) act as heat exchangers for the the Atlantic layer, first by growing ice which is subsequently blown seaward leaving behind a saltier, cold water mass, and second by exporting the water mass so produced to greater depths offshore where it functions as a sink for heat diffusing upward from the Atlantic water.

A temperature maximum in the Subsurface water of the Beaufort Sea has traditionally been identified with a source in the Bering Sea during summer (Coachman and Barnes, 1961). The deeper of the 2 maxima at station 10 (Figure 7a) is almost certainly Bering Sea water ($p = 80$db, $T = -1.25°C$, $S = 32.15$ and $\sigma_t = 25.85$). Maxima at this value of σ_t were found in the 1979 observations also at Stations 3 and 4 (65 and 70db, respectively). An obvious temperature maximum also appears at 23db ($T = -1.29°C$, $S = 32.40$, $\sigma_t = 26.06$) in Amundsen Gulf (Station 6). Because of its shallow depth this maximum may be identified as a vestige of local radiational heating in summer when Amundsen Gulf is substantially ice-free for 2-3 months. Local radiational heating is also the probable cause of temperature maxima at Station 11 ($p = 30$db, $T = -1.06°C$, $\sigma_t = 25.6$), Station 8 ($p = 35$db, $T = -1.18°C$, $\sigma_t = 25.7$), station 5 ($p = 42$db, $T = -1.18°C$, $\sigma_t = 26.8$) and of the uppermost of the two maxima at Station 3 ($p = 45$db, $T = -1.54°C$, $\sigma_t = 25.1$). Typically, however, both Bering Sea and radiational temperature maxima lie in the same density range as the intrusive layers of cold shelf water, and they are rapidly obliterated over the continental slopes as winter advances. Thus tracing the spread of Bering Sea water, in particular, on the basis of its T-S characteristics is not completely reliable. Indeed, no evidence of a flow from Amundsen Gulf west along the Mackenzie slope could be deduced by tracing the temperature for $\sigma = 26.06$, although indications from dynamic calculations and from T-S relations at higher densities are that such a flow occurs.

The lower part of the Subsurface water is the upper part of the main thermocline in the Arctic Ocean. The variability in T-S relationship in this zone is represented by temperature on the surface with salinity 34.0. Figure 9 illustrates that water of this salinity is at least 0.1°C warmer in Amundsen Gulf than out in the Beaufort Sea (Station 10), and that a band of this warmer water is found along the continental slope north of Tuktoyaktuk. The two temperatures at Station 3, differing by 0.1°C, identify a lobe of water from Amundsen Gulf which reaches this location in the 2-day interval between visits.

The implied flows from Amundsen Gulf westward into the Beaufort Sea of salinity 34.8 (Figure 6) and of salinity 34.0 (Figure 9) are similar in geographical pattern, while the temperature anomalies relative to Beaufort Sea water are of opposite sign. As shown in Figure 10a, the T-S relationships in this salinity range are distinctly different, with the Amundsen Gulf relationship (Station 6) showing much less curvature. Grouping of the 1979 observations according to T-S relationship places those stations along the continental slope (7, 9, 11 and 12) definitely in the Amundsen Gulf category, and offslope stations to the west (3, 8 and 4) in this category for salinities less than 34.2. Station 2, to the north of Amundsen Gulf, has an Amundsen Gulf character for salinities greater than 34.2, but joins station 10 as Beaufort Sea water at shallow depths. This grouping is consistent with contouring in Figures 6 and 9. Figure 10b demonstrates inflow of Amundsen

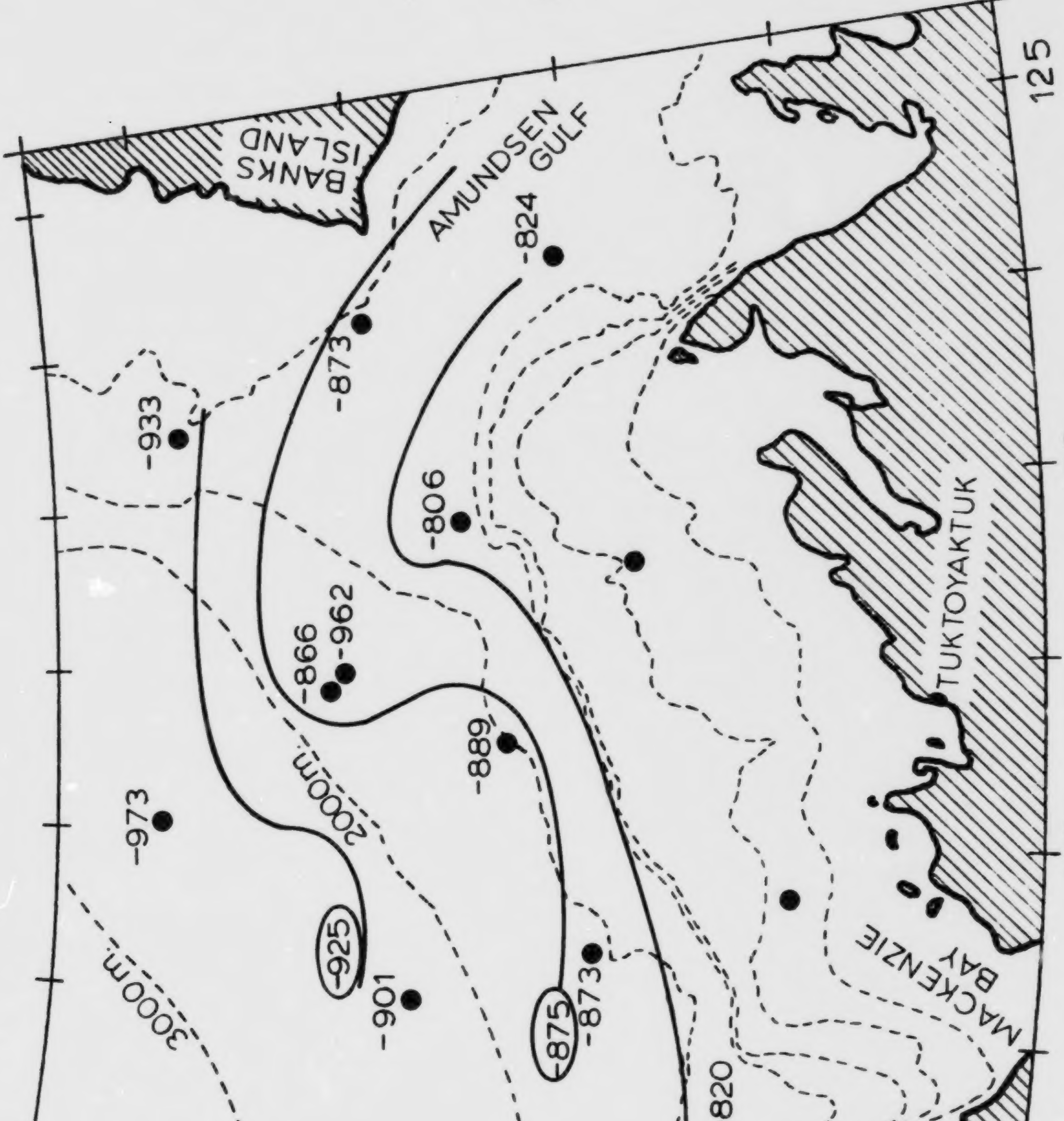


Figure 9. Temperature ($^{0}C*1000$) on the surface with salinity 34.0. The map illustrates systematic variation in T-S relationship in the lower part of the Subsurface layer.

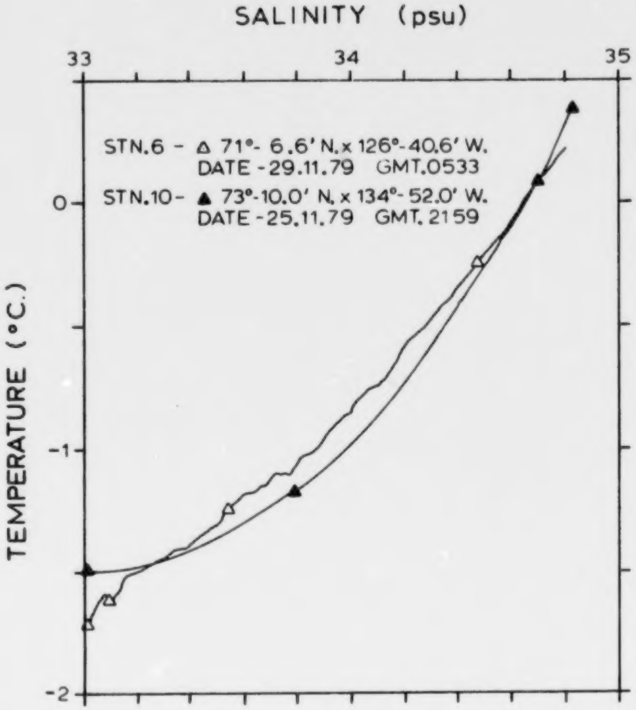


Figure 10a. T-S relationships within the thermocline for water in Amundsen Gulf (station 6) and offshore in the Beaufort Sea (station 10).

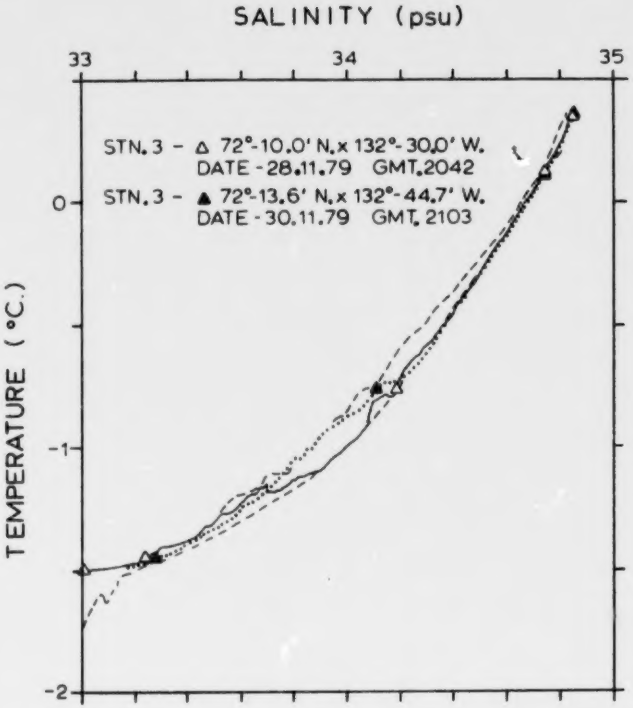


Figure 10b. T-S relationships observed at station 3 at an interval of 2 days. Dashed curves indicate relationships observed in Amundsen Gulf and Beaufort Sea waters as described in a.

Gulf water of salinity 33.7 - 34.2 at station 3 between 28-30 November. The distinct character of the two water masses in the thermocline is well illustrated.

The difference in T-S relationship within the thermocline is a matter for speculation. Since the thermocline water in Amundsen Gulf must originate in the Beaufort Sea, the difference reflects a change in the dynamical conditions maintaining the thermocline. In the Arctic Ocean the thermocline is maintained by a balance between the vertical diffusion of heat from the Atlantic water and intrusions of cold water from Arctic shelves at various depths within the Subsurface Layer (Aagaard et al., 1981; Melling and Lewis, 1982). If the cold water intrusions are reduced, as they might well be in Amundsen Gulf which has extremely narrow shelves, vertical diffusion will predominate. The result is cooling of the Atlantic layer and a warming of the upper thermocline during the residence of water in the Gulf, an effect consistent with the observations. One may speculate that an analogous warming of the upper thermocline and reduction of curvature in the T-S relationship within the thermocline may be encountered in the Arctic Ocean as distance from actively freezing shelves increases.

3.2.3 Arctic Surface Water

The Arctic Surface Layer is vertically well-mixed during winter by turbulence due to wind and ice motion and to the negative buoyancy flux associated with ice formation. Contoured properties of the Arctic Surface Layer in November 1979 are presented in Figure 11.

Figure 11a illustrates the depth of the well-mixed surface layer (depth at which σ_t has increased by 0.02 from its mixed layer value) and Figure 11b its salinity. Mixed layer depth ranges from 9 db to 38 db. A meridional band with a deep mixed layer coincides with higher salinity along 131°W, while along 135°W, a shallow mixed layer is associated with lower salinity. This band to the west could well consist of waters freshened and stabilized during summer by addition of Mackenzie River outflow. Excepting the northeast part of the Mackenzie shelf, salinity variation is not great (30.6 - 31.7). Mixed-layer temperature is close to freezing temperature at all locations but station 6, where warm water at 23db and a sparse ice cover allow surface water to warm to 0.03°C above freezing. The mean deviation from freezing temperature (excluding station 6) is -0.003°C with a standard deviation of 0.006°C, and a slight skew to negative values. Since the accuracy of calibration of the CTD probe for temperature is estimated to be ± 0.005°C the average deviation from freezing temperature is not statistically significant. However, at station 3, where mixed-layer temperature was also measured using 2 thermistors accurate to ± 0.002°C, the computed supercooling relative to the freezing temperature at atmospheric pressure of -0.008°C may well be real. Since a pressure effect can account for a depression of freezing temperature by only 0.0075°C over 10db, the presence of such supercooling in the presence of ice is not easy to explain.

The observation at station 1 of a surface salinity of 33.3 is remarkable. Such a salinity is found at 100db at station 9 over the adjacent slope, while the sea floor salinity of 33.7 at station 1 appears at 140db. Because there is no evidence of recent energetic upwelling of high salinity water onto the shelf and because both surface and seafloor waters at station

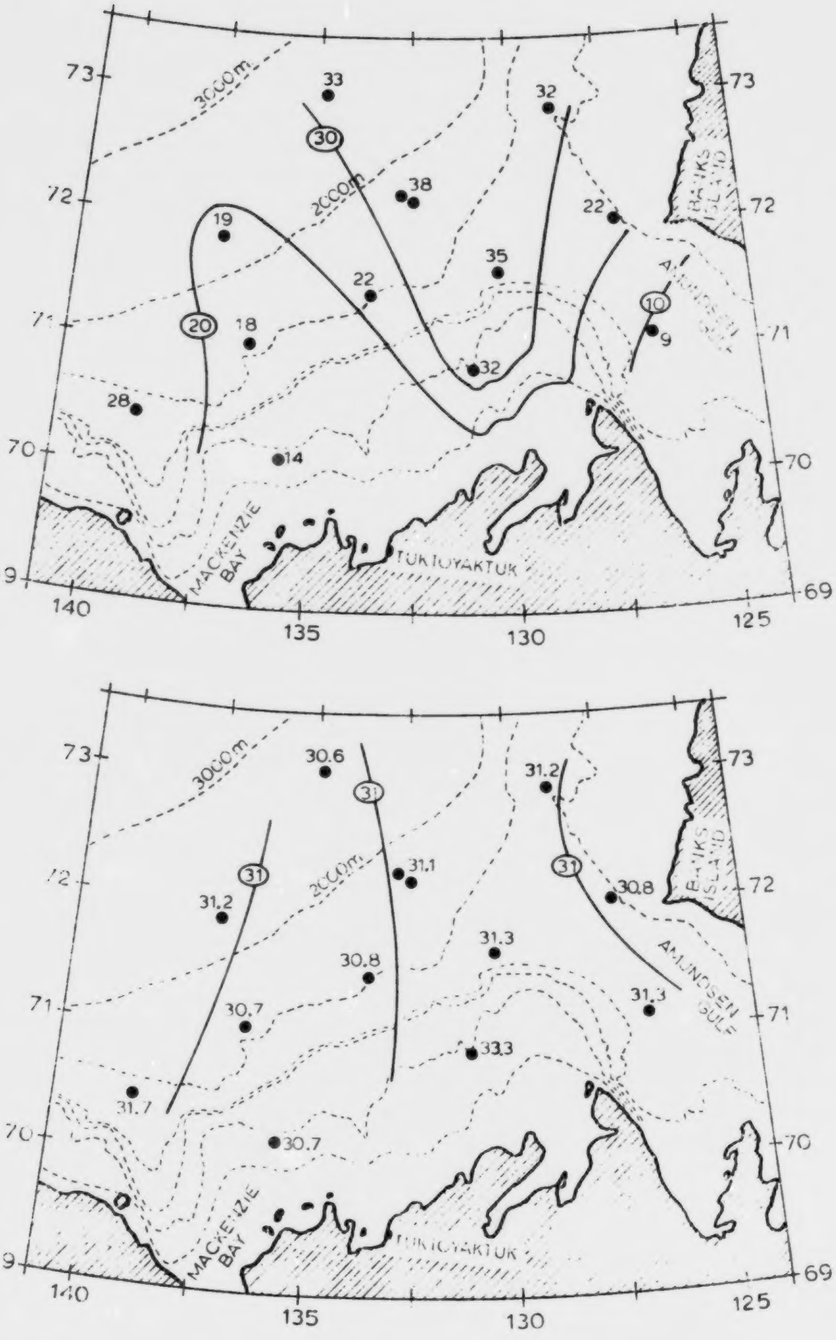


Figure 11a. Depth (m) of the Arctic Surface layer (top).

11b. Salinity of the Arctic Surface layer (bottom).

1 are of freezing temperature, the high salinity might reasonably be attributed to the salinization of shelf water during ice formation. The low temperature indicates that these shelf waters must constitute the cold intrusions into the subsurface layer seen over the continental slope (Melling and Lewis, 1982). The magnitude of the increase in salinity from summertime shelf values (averaged over 50db) of 29-30, however, is not consistent with genesis through freezing alone. Since the growth of 1m of ice of salinity 5 increases the salinity of a 50db layer of seawater by 0.5, a growth of 6m of ice in 2 1/2 months is required to account for the salinity change at station 1. This ice cannot grow in place since only 0.3-0.6m of ice were observed over the entire area of observation in November 1979 and growth of fast ice in the Beaufort Sea amounts to only 2m over an entire season. New ice sheets thicken by about 10cm in the first day of growth. Thus 6m of ice could be grown in about 2 months if there were a continual offshore drift of newly formed ice without a corresponding movement of underlying water. However, since ice removed from one location must be present at another, and since mean drift away from shore is unlikely to exceed 3 km per day, the growth of 6m if ice would be restricted to a band only a few kilometres wide. One is forced by these constraints to postulate some influx of salt onto the Mackenzie shelf during early autumn, presumably as a consequence of upwelling forced by the more energetic wind-driven circulation in the Beaufort Sea in this season. An upwelling of water of salinity 32-33 to within the realm of surface mixing processes has not yet been observed in this area.

3.3 Measured Currents

Direct measurements of water movement were acquired at mid-depth (18m) in the vicinity of station 1 between 27 November and 15 December. Observations are included in Appendix 2. The current meter was positioned within the Arctic Surface Layer, and probably within the Ekman layer at times when ice drift (viz surface stress) was large. The progressive vector for current indicates a net eastward displacement of 56 km in 18 days, or an average speed of 3.6 cm/s. At the same time the ice moves only 6 km eastward (0.4 cm/s) and 21 km southward (1.4 cm/s). During the period 8 - 13 December (days 342-347) when the ice was essentially stationary, water at mid-depth moved eastward at about 4 cm/s. At times of eastward ice movement (e.g 6-8 December; days 340-342) current speed is about 70% of ice speed whereas at times of westward ice movement (e.g. 2-6 December; days 336-340) current speed is only about 40% of ice speed. Thus the observations point to an eastward flow of about 3-4 cm/s at mid-depth in this area upon which is imposed a wind (or ice) driven current as large as 30-40 cm/s. Since the mean current does not appear to be forced by wind or ice movement it may be a persistent feature in this area. Huggett et al., (1977) in the spring of 1975 measured a 5-month mean current at the seafloor of 4.4 cm/s towards the northeast in this vicinity, and northeastward flows of similar magnitude at 4 other locations on the outer part of the Mackenzie Shelf. Measured mean currents at the seafloor at 2 locations on the outer shelf in the summers of 1976 and 1977 (Fissel, 1981), and at 3 locations near the shelf break in the spring of 1981 (Frozen Sea Research Group, unpublished data) are similar in speed and direction.

The hydrographic data discussed in section 3.1 suggest a westward baroclinic shear of perhaps 5 cm/s over the uppermost 45db of the water column in the northeast part of the Mackenzie shelf. By adding this shear to the mean current at mid-depth a tentative current profile can be constructed. Near the seafloor (40m) eastward flow at about 5-6 cm/s occurs; at mid-depth (18m) the flow is also easterly, but weaker (3-4 cm/s); at the surface baroclinic shear has reduced the mean drift to perhaps ± 1 cm/s, and therefore variable direction. The measurements at other seafloor locations referred to above, and the general westward baroclinic shear in the southeast Beaufort Sea suggest that this picture of vertical current variation may be generally applicable on the outer half of the Mackenzie shelf.

There are two mechanisms which might generate an eastward bottom flow. As postulated by Aagaard (1982), the existence of a sea-level difference between the Bering Sea and Baffin Bay might drive a flow of denser Bering Sea water along the seafloor of the Alaskan and Canadian Beaufort shelves beneath the fresher Arctic surface waters. Such a difference in sea-level has yet to be demonstrated. The other possibility is that the eastward flow is a haline circulation forced locally by freezing processes. Volumes of dense shelf water residual to ice formation must slump seaward along the seafloor in the process of geostrophic adjustment. The result for a north-facing shelf is an eastward bottom flow undercutting lighter surface fluid flowing westward to replace it. Representative calculations for the middle part of the Mackenzie shelf (Melling and Lewis, 1982) using a stream-tube model for the flow yield flow speeds of 3-5 cm/s. That these values are comparable to those observed lends credence to the hypothesis.

Since the angle of cross-bathymetric flow resulting from bottom friction is small, the flow requires perhaps one month to move 10 km downslope. Thus more than 6 months would be necessary to transit a shelf the width of the Mackenzie shelf. A bottom flow forced seasonally by ice formation could thus be a year-round feature of the circulation.

4. TEMPORAL VARIABILITY IN REGIONAL OCEANOGRAPHY

4.1 Variability in Dynamic Topography

The issue of variability in dynamic topography is most difficult to address since few historic studies were well designed in terms of station separation and coverage for the mapping of this parameter. The following figures (Figure 12) present maps of 0/300db dynamic height anomaly for those years in which some pattern could be discerned in suitable data. All existing observations (see Cornford et al., 1982 for compilation) were inspected subjectively as profiles and as T-S relationships prior to use. Suspect data were edited where feasible, or otherwise discarded. General comments are as follows:

i) Within the Beaufort gyre, the isolines of constant dynamic height tend to run parallel to isobaths and surface elevation decreases to the south and east. The 450-mm isoline overlies the 2500-m isobath in winter and advances to the position of the 1500 m isobath in summer.

ii) In winter dynamic height decreases monotonically to the edges of the Banks and Mackenzie shelves. In summer the decrease in dynamic height towards the Mackenzie shelf frequently ceases near the 450-mm isoline and a sharp increase in dynamic height over the continental slope is observed. Meandering of isolines is common in this region.

iii) Within the gyre, shear (0/300db) is directed southwestwards and averages 5 cm/s shorewards of the 2500-m isobath. Interannual variations fall in a range from 3.5-6.0 cm/s and no seasonal effects are evident. The reversal in sea-surface slope near the Mackenzie shelf in summer causes an eastward baroclinic shear which reaches 15 cm/s (0/300db) in places.

iv) Inflow to Amundsen Gulf may be inferred from the hydrographic data from a number of summers. Concurrent outflow is occasionally evident. Baroclinic shear (0/300db) in both inflow and outflow is 5-10 cm/s.

The shoreward movement of the 450-mm isoline in summer is a reflection of the freshening and warming of surface water due to ice melting and river inflow. The large dynamic heights observed over the Mackenzie slope in summer are evidence of the warm, brackish plume from the Mackenzie River which has been pushed offshore by easterly winds. The otherwise eastward motion of water within the plume results from a balance between buoyancy and Coriolis forces. At some times it is this buoyancy current which constitutes the inflow into Amundsen Gulf. At other times a meander of the Beaufort gyre into the gulf from the northwest is the apparent source of the inflow.

4.2 Variability in T-S Relations

Hydrographic studies have been conducted in the Beaufort Sea intermittently over the past 30 years. It is informative to examine the T-S

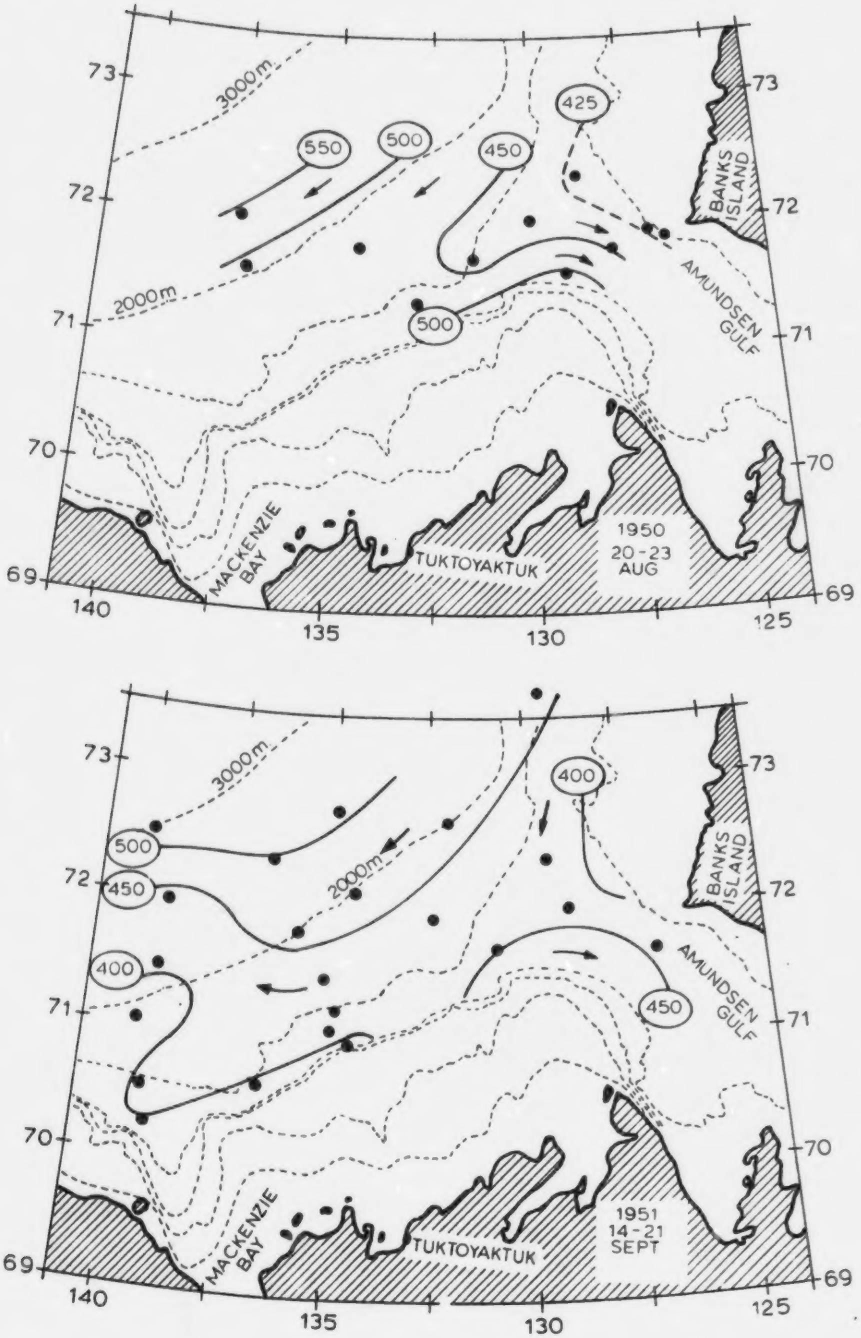


Figure 12a, b. Maps of dynamic height (0/300db) anomaly in the Beaufort Sea (dyn.mm): a) 1950 (top); b) 1951 (bottom).

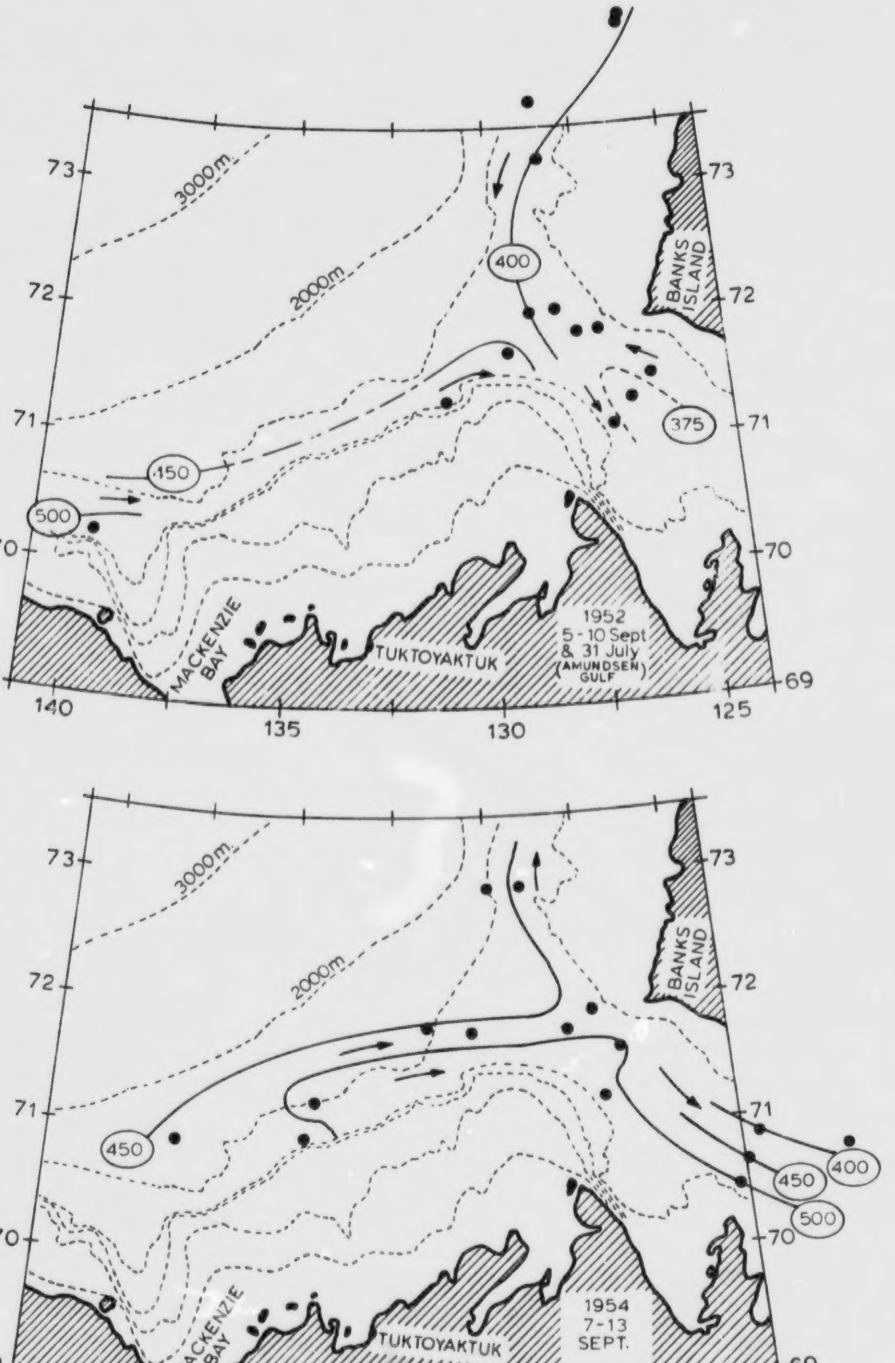


Figure 12c,d. Maps of dynamic height (0/300db) anomaly in the Beaufort Sea (dyn.mm): c) 1952 (top); d) 1954 (bottom).

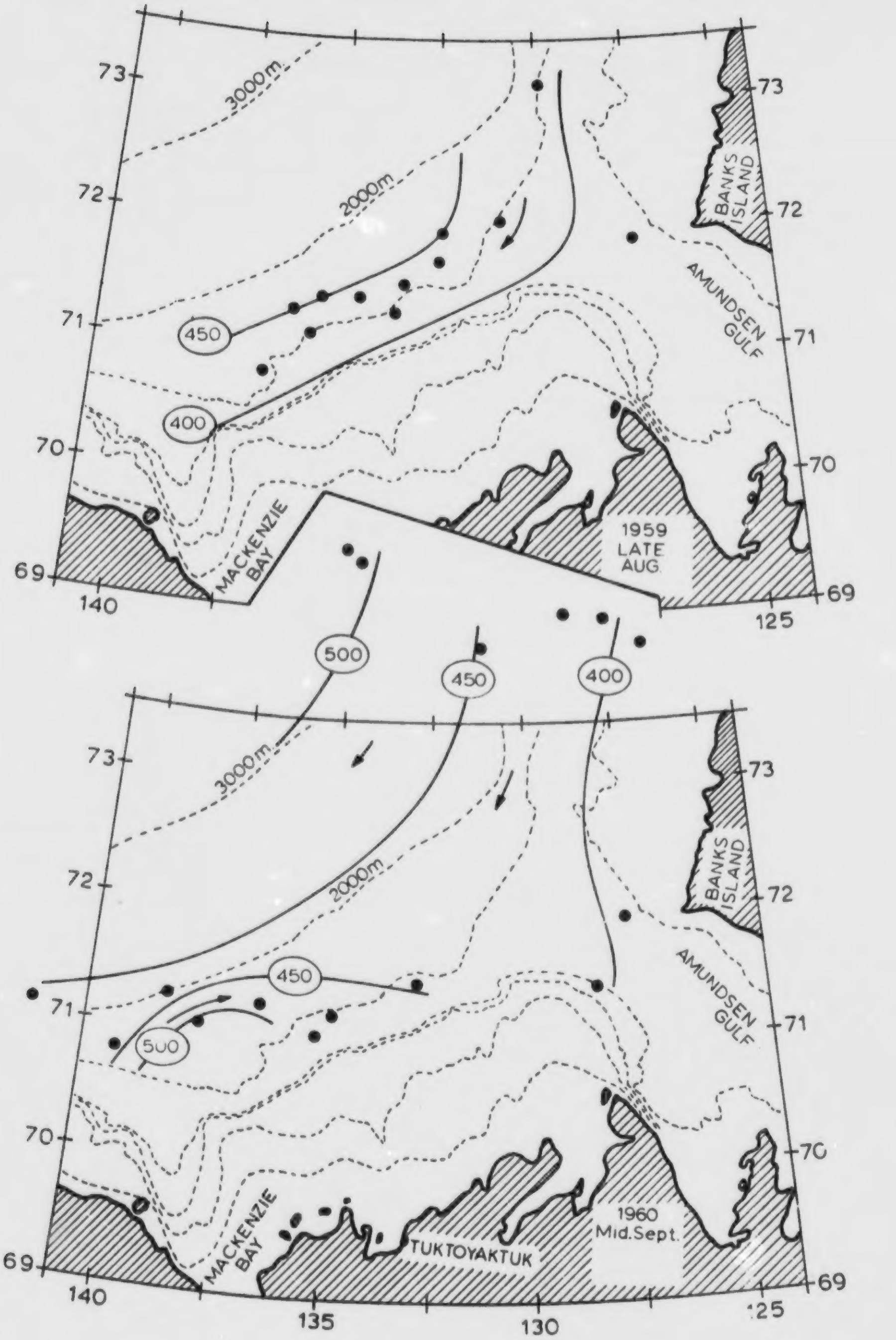


Figure 12e,f. Maps of dynamic height (0/300db) anomaly in the Beaufort Sea (dyn.mm): e) 1959 (top); f) 1960 (bottom).

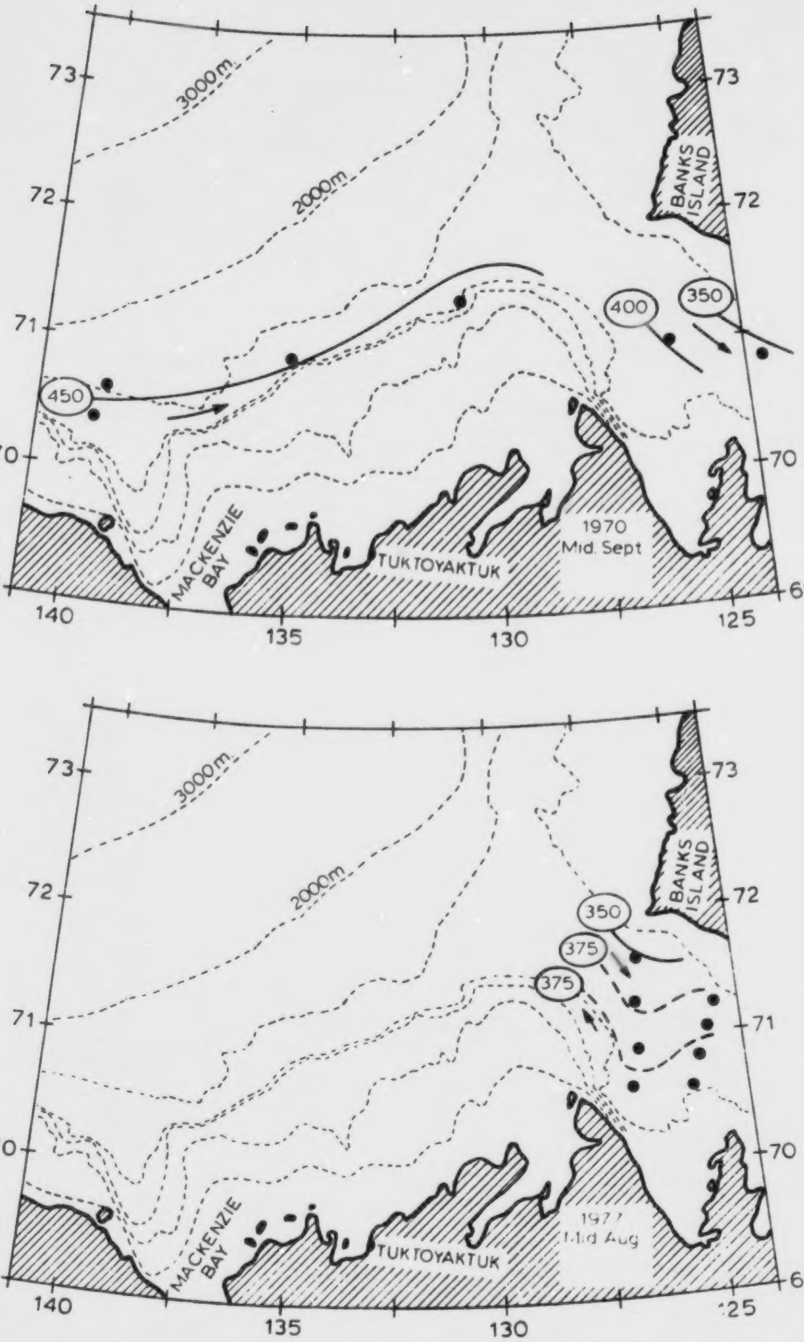


Figure 12g,h. Maps of dynamic height (0/300db) anomaly in the Beaufort Sea (dyn.mm): g) 1970 (top); h) 1977 (bottom).

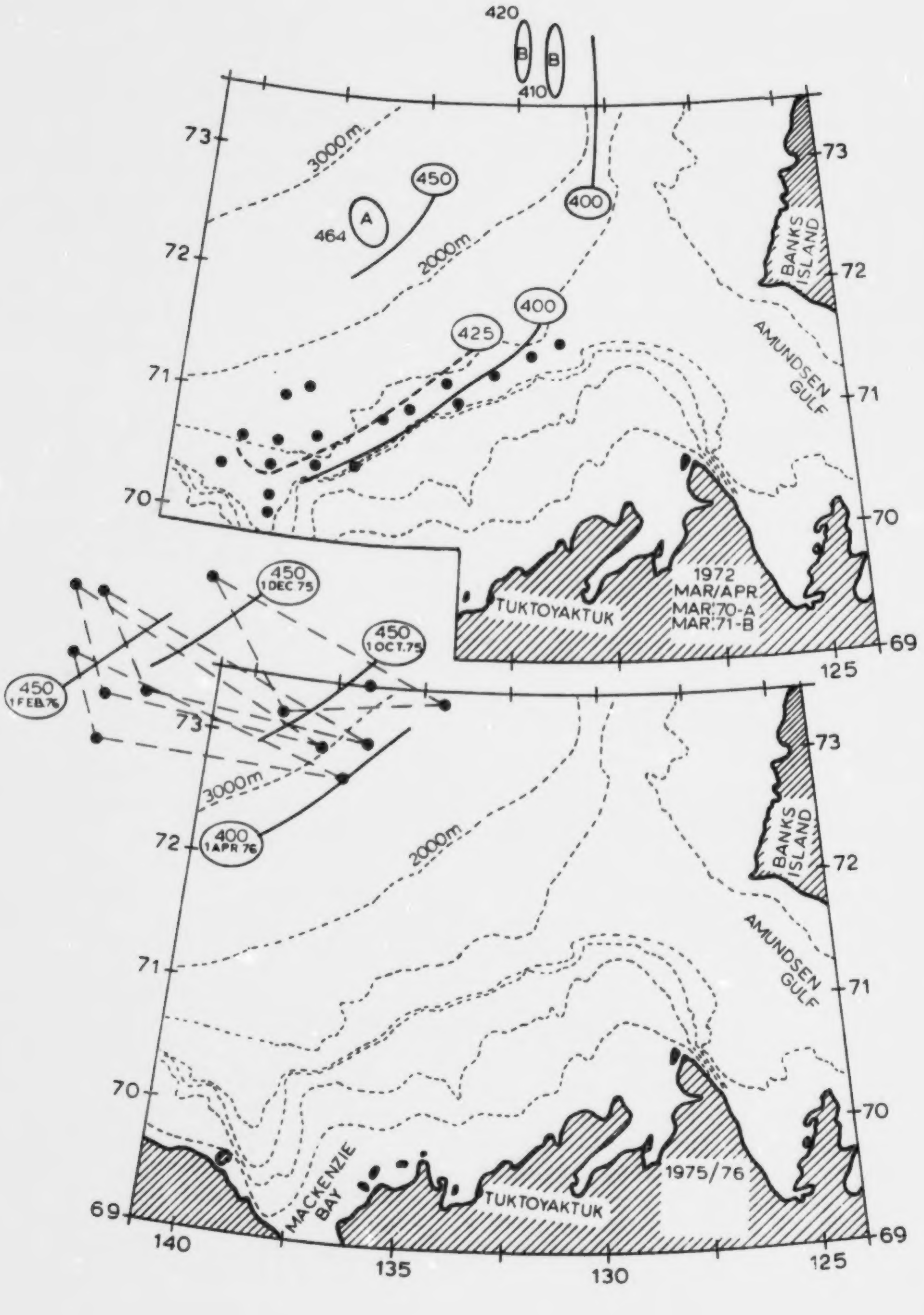


Figure 12i,j. Maps of dynamic height (0/300db) anomaly in the Beaufort Sea (dyn.mm): i) late winter 1970, 1971 and 1972 (top); j) late winter 1975 and 1976 (bottom).

relationships found in historic data to determine if the regional differences discussed in section 3.2 are consistently observed.

Data from stations occupied in 6 different years within an ellipse (80 km x 40 km) centered on station 6 and oriented along local bathymetry are shown in Figure 13. Because all observations were acquired in August and September, the surface water is warmer than in November 1979. The broad minimum in temperature near salinity 33 appears in all years in the range -1.5°C to -1.6°C. The observations within the main thermocline match closely those from November 1979. The historic data thus confirm the existence of distinct water mass within the main thermocline in Amundsen Gulf, and demonstrate the origin in summertime radiational heating of the wintertime subsurface temperature maximum.

Few profiles have been acquired in the vicinity of station 10, the most northerly of the 1979 study. Seven profiles are shown in Figure 14 from stations up to 150 km distant from station 10. The historic data follow the 1979 observations very closely except in near-surface waters where summer data show local warming. The curvature of the T-S relationship within the main thermocline is well replicated. The continued existence in this area of thermocline water distinct from that in Amundsen Gulf is thus confirmed. A reliable presence of water from the Bering Sea is indicated.

Station 9 lies in the region of possible confluence of waters within the Beaufort gyre and those leaving Amundsen Gulf. Figure 15 shows data from 5 years taken within an ellipse such as described above centered on this station. In addition to the expected seasonal variation in temperature of near-surface waters, there is considerable (~0.3°C) variation in temperature in the broad minimum centered near salinity 33. This variability is an indication of the active interleaving of cold, dense shelf waters over the continental slope in the Beaufort Sea, and of its dependence on interannual variations in ice conditions on the shelf. Within the main thermocline near station 9 there is evidence of Amundsen Gulf water in some years and Beaufort gyre water in others. Thus the outflow of water from the gulf and along the slope observed in 1979 does not appear to be a persistent feature.

4.3 Seasonal Variations in Surface Water Salinity

The mean salinity of the upper 50m is a convenient measure of the salinity of the Arctic Surface water. However, few studies of the Beaufort Sea have been suited to the quantification of this parameter over both shelf and basin areas. Figure 16 based on data from 1951 and 1952 demonstrates that in summer surface waters over the basin and over the shelf have salinities of 30-31 and 28-30 respectively. Figure 17 presents the same parameter from two of the three late winter programs in the area (1975 observations have been ignored because unusually heavy ice cover during the preceding summer kept summertime salinities unusually low and reduced wintertime ice growth). Surface waters in winter have salinities of 31-31.5 over the basin and 31-33 over the shelf. The seasonal change is thus ~1 over the basin and 2 or greater over the shelf, with an accompanying reversal in the direction of the horizontal gradient. The observed wintertime increase over the basin would result if 2m of ice were grown there, whereas over the shelf at least 4m of new ice would be necessary. From another

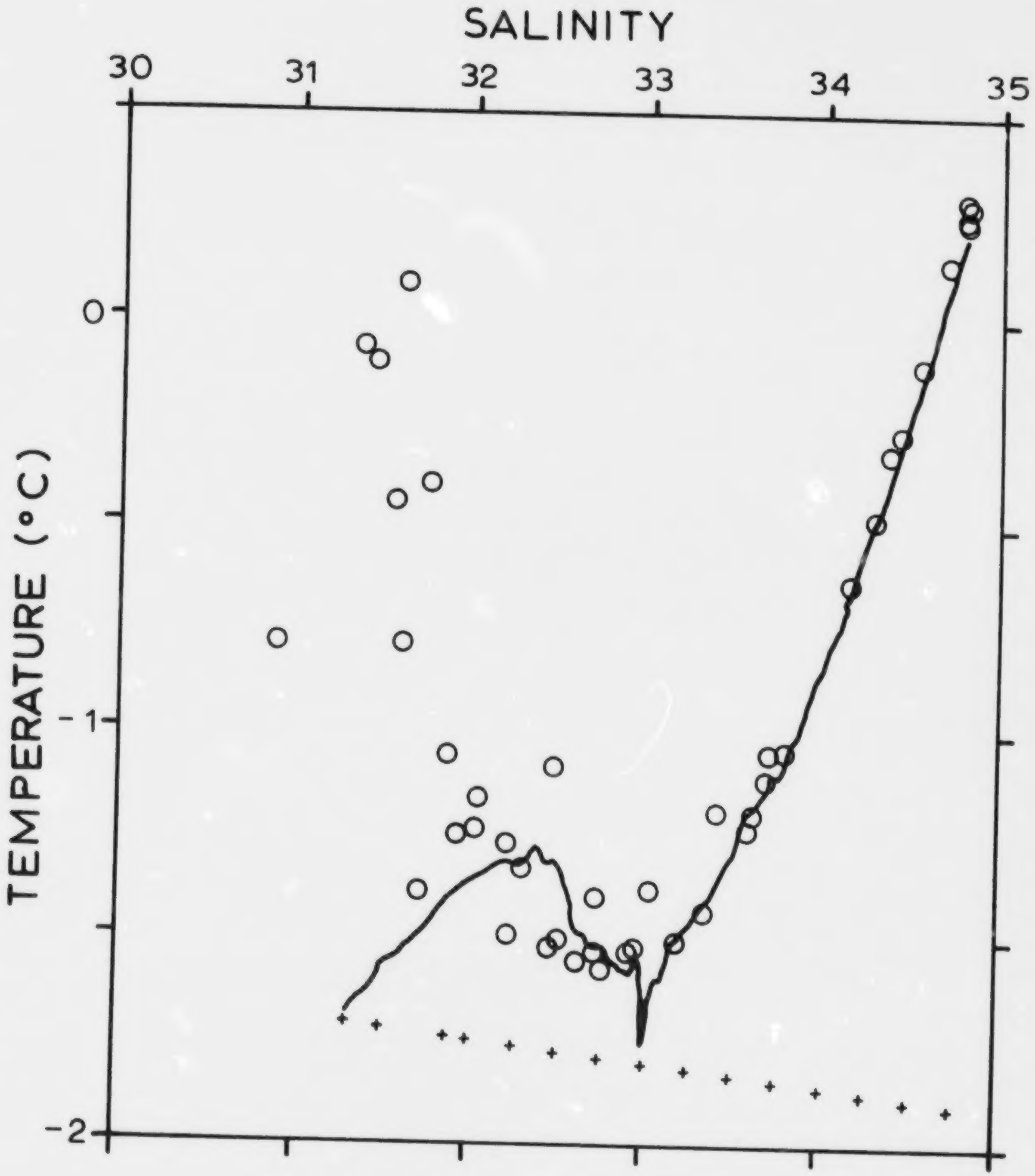


Figure 13. T-S variability observed in the vicinity of station 6 (Amundsen Gulf). Data are plotted from 1951 (Cancolim II; 14), 1952 (Cancolim II; 54), 1954 (USS Burton Island; 60), 1957 (USCGC Spar; 1), 1970 (CSS Hudson; 271) and 1977 (Pandora II; 21). The solid line depicts 1979 observations at station 6.

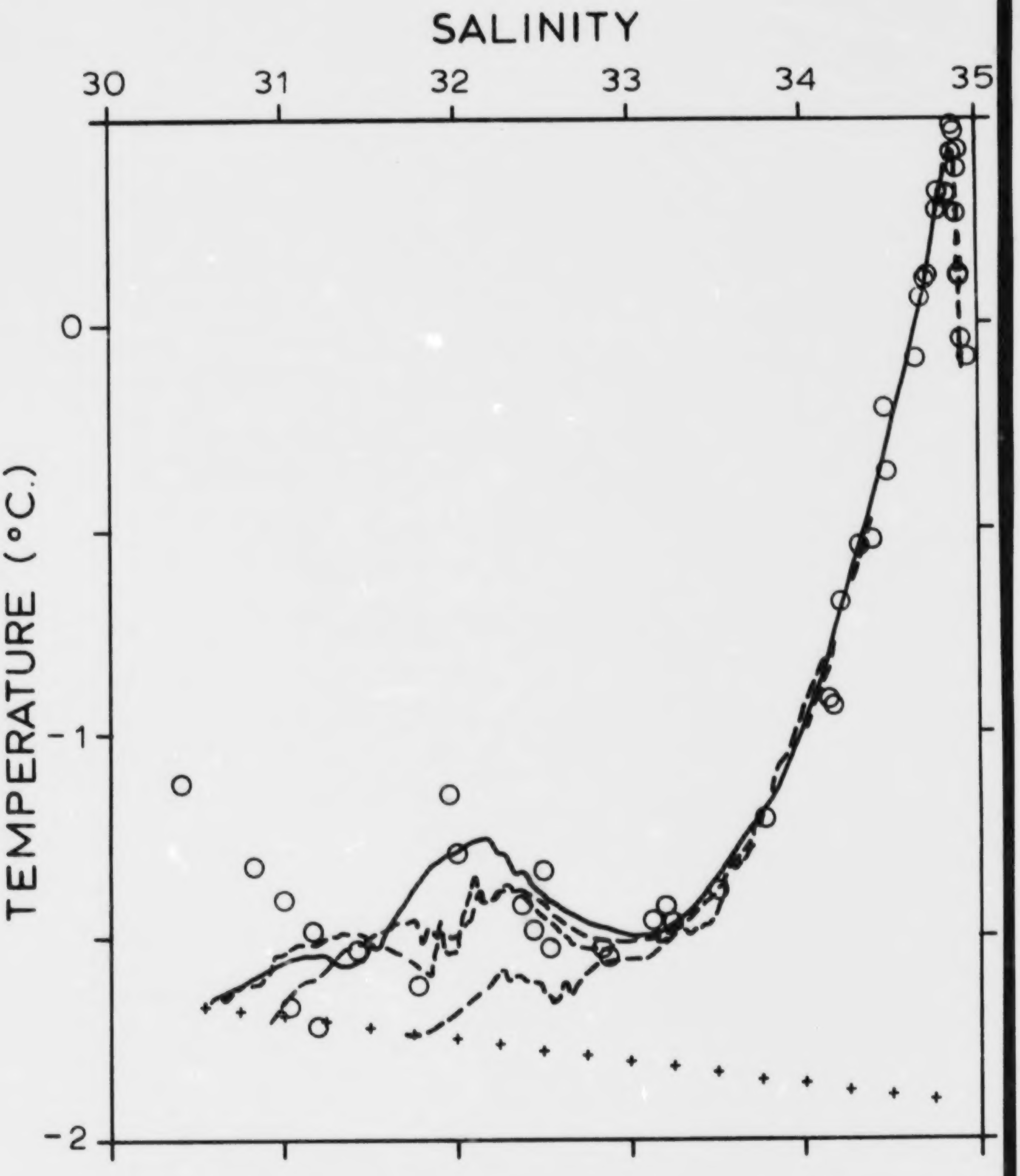


Figure 14. T-S variability observed in the central Beaufort Sea. Data are plotted from 1951 (USS Burton Island; 73), 1960 (USS Burton Island; 29). 1970 (AIDJEX'70; 22), 1971 (AIDJEX'71; 30), 1975 (AIDJEX'75; BF192), 1976 (AIDJEX '76; SB530) and 1981 (Frozen Sea Research Group; 31). Data from 1975, 1976, and 1981 are shown by dashed lines where distinguishable from the 1979 observations at station 10 (solid line).

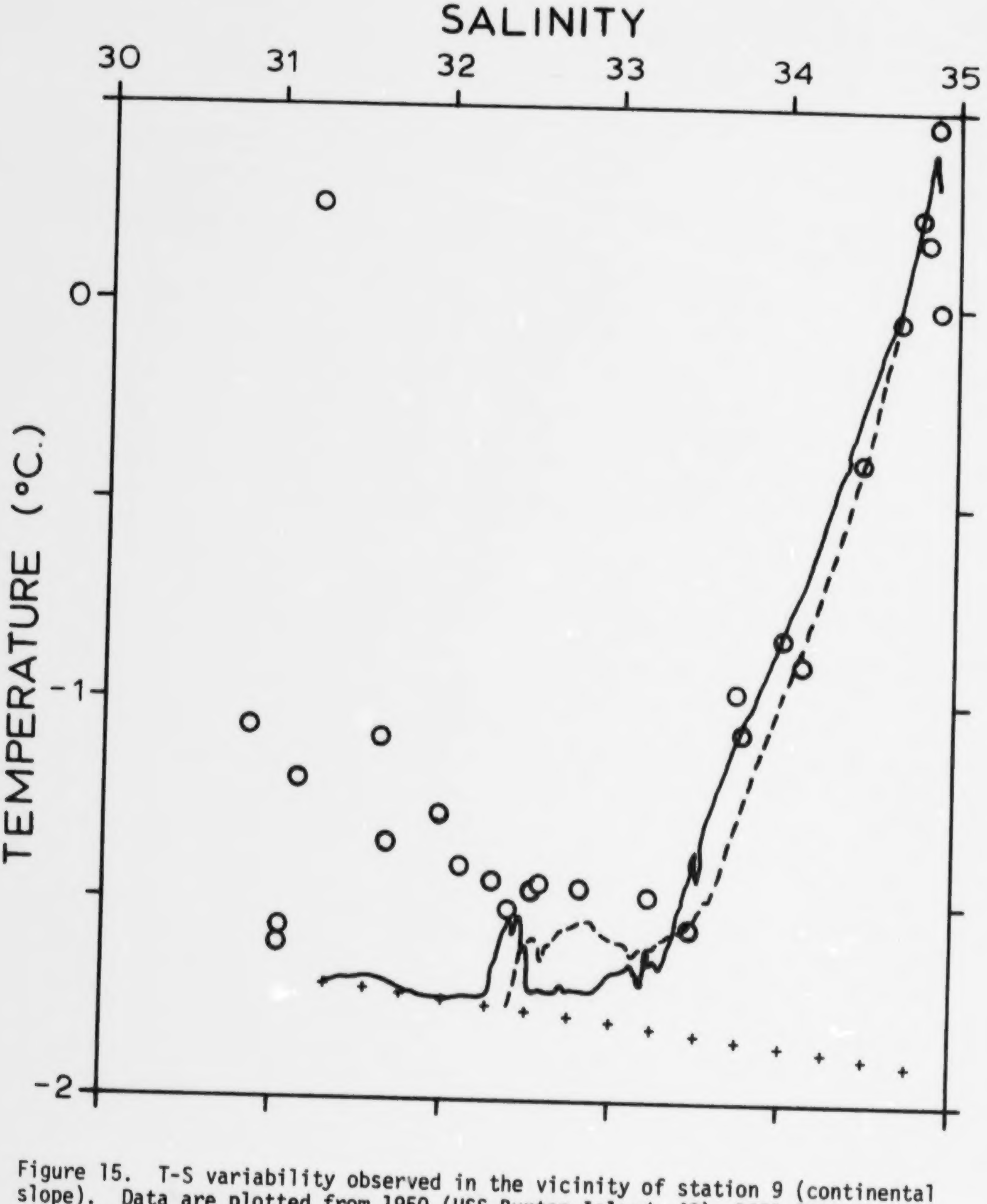
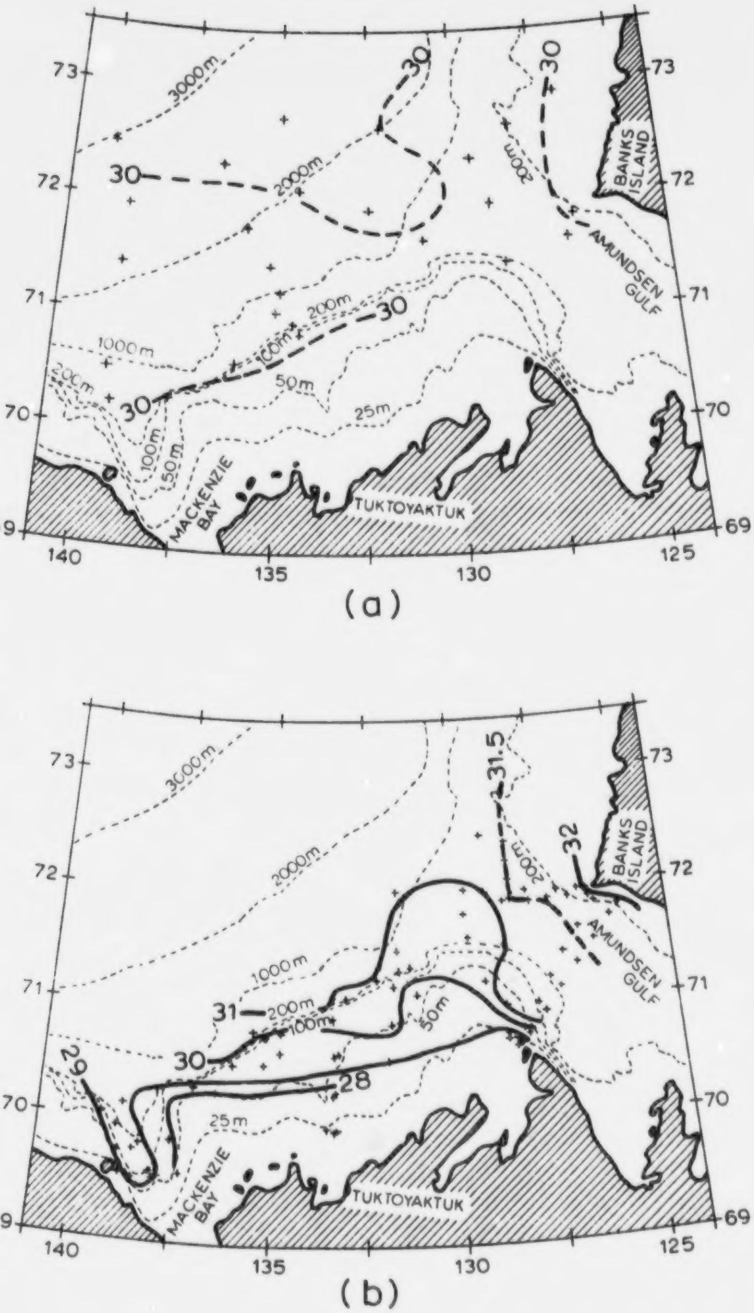
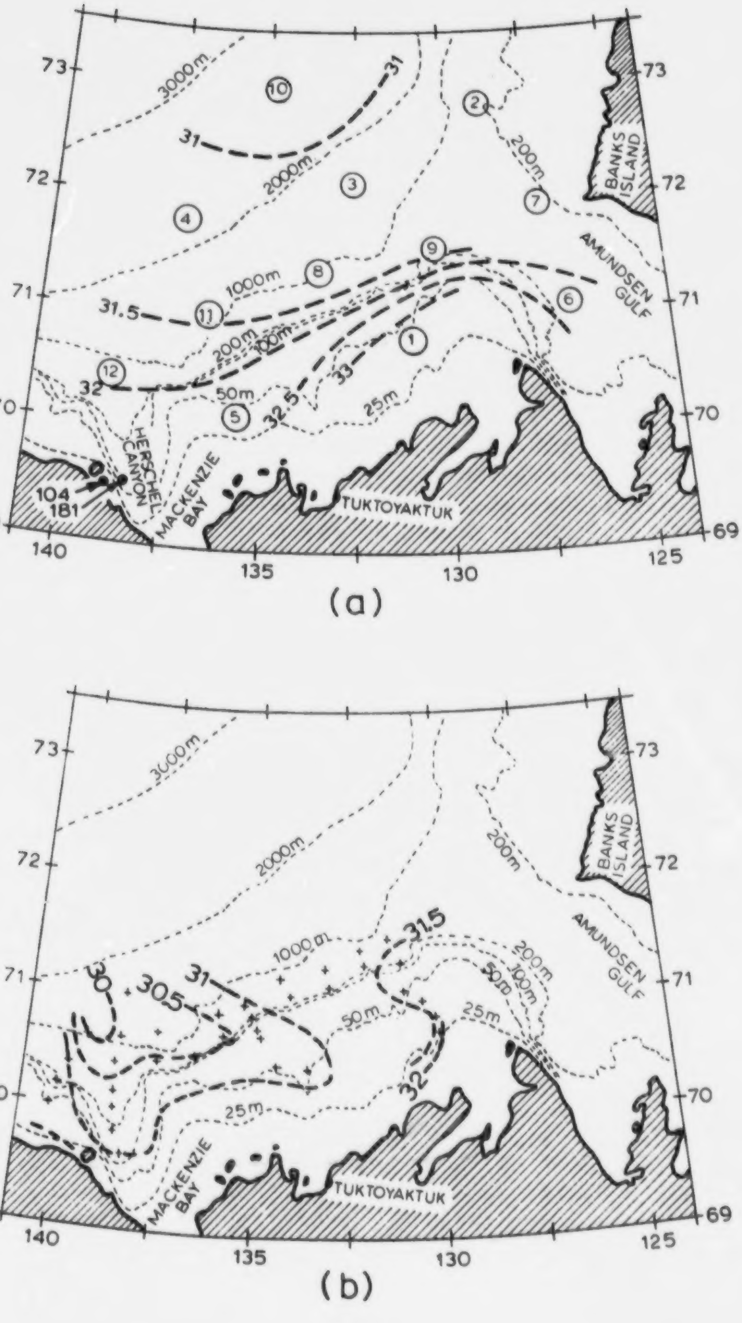


Figure 15. T-S variability observed in the vicinity of station 9 (continental slope). Data are plotted from 1950 (USS *Burton Island*; 49), 1951 (USS *Burton Island*; 83), 1954 (CCGS *Labrador*; 87), 1972 (Dalhousie University; 6) and 1981 (Frozen Sea Research Group; 34, dashed curve). The solid curve depicts 1979 observations at station 9.



Figures 16a,b. Average salinity of the uppermost 50 m in summer:
a) Mid-September 1951 (USS Burton Island); (USNHO, 1954);
b) Late August 1952 (Cancolim II); (Cameron, 1953)



Figures 17a,b. Average salinity of the uppermost 50 m in winter:

a) Late November 1979 (present study);

b) Late March 1972 (Vilks, 1973).

viewpoint, melting of the 2m of ice would produce the observed summertime freshening over the basin, while over the shelf river input must also be considered. Since the Mackenzie River supplies fresh water sufficient to cover the shelf (150 km x 400 km) to a depth of 5-6m each year, a hypothetical mixing of this inflow with 44-45m of winter shelf waters would yield a salinity reduction for the mixture of 3-4. Ice melting could contribute the further reduction of 1 to observed values. The salinity decrease during spring is thus explicable if an export of 5-6m of wintertime water from the shelf is assumed. The increase during autumn requires postulation of a corresponding import of salt from the basin to obviate the unrealistic requirement for more than 4m of seasonal ice growth in these areas.

Summertime sections which might reveal a residue of the wintertime shelf waters were acquired in 1952 and 1970 on the northeast part of the Mackenzie shelf. In 1970 no residue was observed, but in 1952 one station near Baillie Islands detected a salinity of 33 at the seafloor in 25m of water. This water had been warmed to -1.34°C from its (presumed original) freezing temperature, and was thereby analogous to water found at station 5 in November 1979. The apparent scarcity of such water in summer should not be considered conclusive, however, since the Nansen bottle casts customarily used in the past are not well suited to its detection.

5. SUMMARY

The baroclinic shear in the southeastern Canada Basin is largely confined to the upper 300db and is directed southwestward parallel to bathymetric contours. Over the last 30 years the horizontally averaged shear has been 3.5 - 6 cm/s in both late summer and winter. The barotropic current component is not known.

A baroclinic jet exists over the continental slope where the shear (0/300db) increases to 10 cm/s.

Baroclinic shear over the Mackenzie shelf is southwestward in winter when shelf water salinity increases with ice growth to values greater than those offshore and weak or northeastward in summer when river flow is at a maximum. There are growing indications of a persistent northeastward current at the seafloor on the middle and outer shelf.

Flow through the mouth of Amundsen Gulf is variable. The observations of November 1979 indicate an outflow of water from the gulf and southwest along the continental slope. The outflow must be compensated by an inflow, although this was not detected. Evidence from other years suggests that the outflow along the slope is not always present and that inflow may occur at times on the northern or the southern parts of the entrance to the gulf.

Atlantic water (0°C isotherm) is found at 220m depth over the continental slope. Atlantic water within Amundsen Gulf is cooler than that in the Canada Basin at salinity 34.8 and warmer than that at salinity 34. Upward diffusion of heat from the Atlantic layer during the residence of this water in the gulf is thus indicated.

Lowest temperatures in the Subsurface layer are near the surface freezing temperature and are found over the slopes and shelves. Temperature profiles indicate an active interleaving into the halocline of cold, saline water produced on the shelves through freezing. Source water of suitable salinity and temperature was found on the Mackenzie shelf in November 1979 after only 2-1/2 months of ice formation.

Subsurface temperature maxima found in early winter may be identified with Bering Sea summer water or with vestiges of local radiative heating during the summer.

Surface waters in early winter display systematic variations in mixed depth and salinity, while temperatures are close to freezing. Large seasonal changes in shelf-water salinity (2-3) cannot be explained on the basis of ice growth and decay and river inflow alone. Significant exchanges of salt between the basin and the shelf must be postulated.

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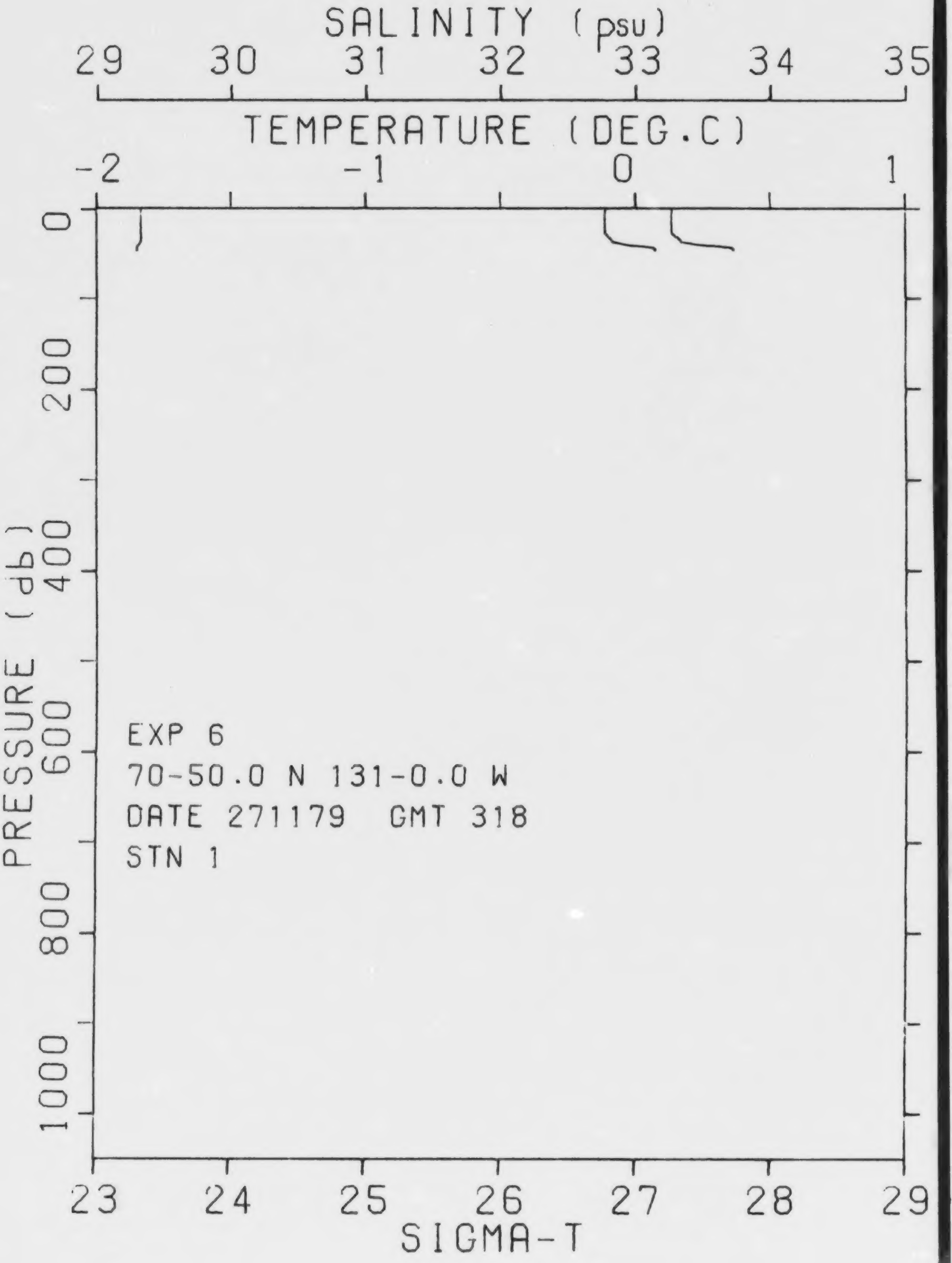
Appendix 1

CTD Profiles

The CTD data are the main component of this report and are presented in some detail. A list for each CTD cast of temperature, salinity, sigma-t, dynamic height anomaly and sound speed, interpolated to a standard set of pressure levels, follows a plot of the profiles. Casts are ordered by location number. Following these, T-S curves are presented in the same sequence. Symbols on the T-S curves appear at pressures of 50, 100, 150, 200, 300, 400, 500, 750, 1000db, where applicable. In the profile plots, curves for each parameter are not identified. In general, temperature appears on the left, and salinity and density may be discriminated on the basis of the listings. The notation "psu" for salinity represents "practical salinity unit", a designation which is currently considered unnecessary. No plots are included for experiments 5 and 7 at station 1, experiments 11 and 19 at station 3 and experiments 16 and 17 at station 5 because the differences from the first profile at each station which is illustrated are visually subtle.


SALINITY (psu)
29
30
31
32
33
34
35
TEMPERATURE (DEG.C)
-2
-1
0
1
PRESSURE (db)
0
200
400
600
800
1000
EXP 6
70-50.0 N 131-0.0 W
DATE 271179 GMT 318
STN 1
23
24
25
26
27
28
29
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 1 EXPERIMENT NO. 5 DATE 271179 GMT 257
LAT. 70-50.0 N LONG. 131-00.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
3.3	-1.829	33.271	26.776	.0041	1438.40
4.0	-1.828	33.270	26.775	.0050	1438.41
5.0	-1.829	33.270	26.775	.0063	1438.42
6.0	-1.829	33.269	26.775	.0076	1438.44
7.0	-1.829	33.270	26.775	.0088	1438.46
8.0	-1.828	33.269	26.774	.0101	1438.47
9.0	-1.829	33.270	26.775	.0113	1438.49
10.0	-1.829	33.270	26.775	.0126	1438.51
11.0	-1.830	33.270	26.775	.0139	1438.52
12.0	-1.830	33.270	26.775	.0151	1438.54
13.0	-1.830	33.270	26.775	.0164	1438.55
14.0	-1.831	33.271	26.776	.0176	1438.56
15.0	-1.830	33.271	26.776	.0189	1438.58
16.0	-1.831	33.271	26.776	.0202	1438.60
17.0	-1.831	33.273	26.778	.0214	1438.62
18.0	-1.830	33.272	26.777	.0227	1438.63
19.0	-1.831	33.273	26.777	.0239	1438.65
20.0	-1.830	33.270	26.775	.0252	1438.67
21.0	-1.828	33.270	26.775	.0265	1438.69
22.0	-1.829	33.271	26.776	.0277	1438.71
23.0	-1.828	33.270	26.775	.0290	1438.72
24.0	-1.829	33.270	26.775	.0302	1438.74
25.0	-1.829	33.270	26.775	.0315	1438.75
26.0	-1.828	33.271	26.776	.0328	1438.77
27.0	-1.829	33.271	26.776	.0340	1438.79
28.0	-1.828	33.271	26.776	.0353	1438.81
29.0	-1.829	33.276	26.780	.0365	1438.83
30.0	-1.828	33.281	26.784	.0378	1438.86
31.0	-1.828	33.286	26.788	.0390	1438.88
32.0	-1.828	33.290	26.791	.0403	1438.90
33.0	-1.826	33.299	26.799	.0415	1438.94
34.0	-1.827	33.307	26.805	.0427	1438.96
35.0	-1.829	33.313	26.810	.0440	1438.97
36.0	-1.831	33.317	26.813	.0452	1438.99
37.0	-1.831	33.320	26.815	.0464	1439.01
38.0	-1.831	33.321	26.816	.0476	1439.03
39.0	-1.828	33.329	26.823	.0489	1439.07
40.0	-1.831	33.365	26.852	.0501	1439.12
41.0	-1.835	33.445	26.917	.0512	1439.23
42.0	-1.836	33.494	26.957	.0523	1439.31
43.0	-1.839	33.548	27.001	.0534	1439.39
44.0	-1.842	33.601	27.044	.0544	1439.47
45.0	-1.844	33.665	27.096	.0554	1439.56

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
46.0	-1.844	33.717	27.139	.0563	1439.65
46.0	-1.844	33.716	27.138	.0563	1439.65

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STATION 1 EXPERIMENT NO. 6 DATE 271179 GMT 318
LAT. 70-50.0 N LONG. 131-00.0 W

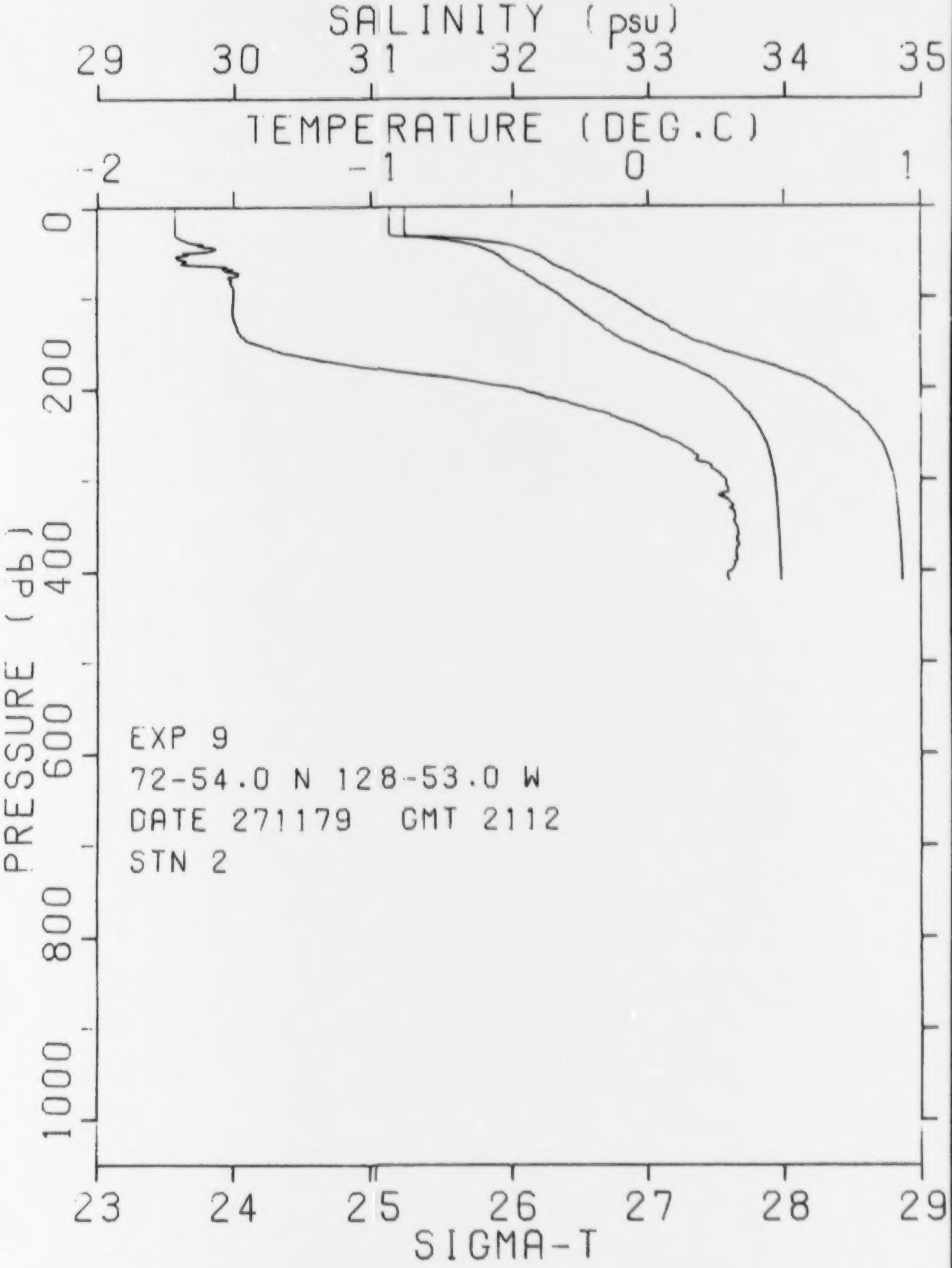
PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.2	-1.834	33.271	26.776	.0028	1438.36
3.0	-1.834	33.271	26.776	.0038	1438.37
4.0	-1.833	33.270	26.775	.0050	1438.39
5.0	-1.834	33.271	26.776	.0063	1438.40
6.0	-1.834	33.271	26.776	.0076	1438.42
7.0	-1.834	33.271	26.776	.0088	1438.44
8.0	-1.834	33.271	26.776	.0101	1438.45
9.0	-1.834	33.271	26.776	.0113	1438.47
10.0	-1.834	33.271	26.776	.0126	1438.48
11.0	-1.834	33.270	26.775	.0139	1438.50
12.0	-1.834	33.271	26.776	.0151	1438.52
13.0	-1.833	33.270	26.775	.0164	1438.53
14.0	-1.833	33.270	26.775	.0176	1438.55
15.0	-1.834	33.270	26.775	.0189	1438.57
16.0	-1.833	33.269	26.774	.0202	1438.58
17.0	-1.834	33.271	26.776	.0214	1438.60
18.0	-1.833	33.270	26.775	.0227	1438.62
19.0	-1.835	33.272	26.777	.0239	1438.63
20.0	-1.834	33.272	26.777	.0252	1438.65
21.0	-1.834	33.271	26.776	.0265	1438.67
22.0	-1.834	33.271	26.776	.0277	1438.68
23.0	-1.834	33.273	26.777	.0290	1438.70
24.0	-1.833	33.271	26.776	.0302	1438.72
25.0	-1.833	33.271	26.776	.0315	1438.73
26.0	-1.834	33.273	26.777	.0327	1438.75
27.0	-1.834	33.272	26.777	.0340	1438.76
28.0	-1.834	33.273	26.777	.0353	1438.78
29.0	-1.833	33.273	26.778	.0365	1438.80
30.0	-1.833	33.280	26.783	.0378	1438.83
31.0	-1.834	33.293	26.794	.0390	1438.86
32.0	-1.832	33.298	26.798	.0403	1438.89
33.0	-1.831	33.312	26.809	.0415	1438.93
34.0	-1.832	33.318	26.814	.0427	1438.95
35.0	-1.833	33.333	26.827	.0439	1438.98
36.0	-1.833	33.338	26.830	.0451	1439.01
37.0	-1.834	33.341	26.832	.0463	1439.02
38.0	-1.834	33.342	26.833	.0475	1439.04
39.0	-1.836	33.362	26.850	.0487	1439.08
40.0	-1.839	33.424	26.900	.0499	1439.17
41.0	-1.841	33.466	26.935	.0510	1439.23
42.0	-1.843	33.525	26.983	.0521	1439.32
43.0	-1.849	33.626	27.065	.0531	1439.46
44.0	-1.850	33.709	27.133	.0541	1439.59

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
45.0	-1.849	33.727	27.147	.0550	1439.63
46.0	-1.850	33.733	27.152	.0559	1439.65
47.0	-1.849	33.733	27.152	.0568	1439.67
47.3	-1.849	33.733	27.152	.0571	1439.68

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 1 EXPERIMENT NO. 7 DATE 271179 GMT 332
LAT. 70-50.0 N LONG. 131-00.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
1.2	-1.835	33.279	26.782	.0015	1438.35
2.0	-1.834	33.275	26.779	.0025	1438.36
3.0	-1.834	33.277	26.781	.0038	1438.38
4.0	-1.833	33.274	26.778	.0050	1438.39
5.0	-1.833	33.273	26.778	.0063	1438.41
6.0	-1.834	33.274	26.778	.0075	1438.42
7.0	-1.834	33.270	26.775	.0088	1438.43
8.0	-1.833	33.269	26.775	.0101	1438.45
9.0	-1.834	33.270	26.775	.0113	1438.47
10.0	-1.833	33.267	26.773	.0126	1438.48
11.0	-1.833	33.268	26.773	.0138	1438.50
12.0	-1.832	33.266	26.772	.0151	1438.52
13.0	-1.833	33.267	26.773	.0164	1438.53
14.0	-1.834	33.267	26.773	.0176	1438.55
15.0	-1.833	33.267	26.773	.0189	1438.56
16.0	-1.834	33.268	26.773	.0202	1438.58
17.0	-1.834	33.268	26.774	.0214	1438.59
18.0	-1.834	33.267	26.773	.0227	1438.61
19.0	-1.834	33.269	26.774	.0239	1438.63
20.0	-1.834	33.268	26.773	.0252	1438.64
21.0	-1.833	33.267	26.773	.0265	1438.66
22.0	-1.833	33.267	26.773	.0277	1438.68
23.0	-1.833	33.267	26.772	.0290	1438.69
24.0	-1.833	33.267	26.773	.0302	1438.71
25.0	-1.834	33.269	26.774	.0315	1438.73
26.0	-1.834	33.269	26.774	.0328	1438.74
27.0	-1.834	33.271	26.776	.0340	1438.76
28.0	-1.834	33.270	26.775	.0353	1438.78
29.0	-1.834	33.270	26.775	.0365	1438.79
30.0	-1.834	33.271	26.776	.0378	1438.81
31.0	-1.833	33.279	26.782	.0391	1438.84
32.0	-1.833	33.286	26.788	.0403	1438.87
33.0	-1.834	33.293	26.794	.0415	1438.89
34.0	-1.834	33.302	26.801	.0428	1438.92
35.0	-1.832	33.304	26.803	.0440	1438.95
36.0	-1.832	33.308	26.806	.0452	1438.97
37.0	-1.832	33.321	26.817	.0465	1439.01
38.0	-1.835	33.354	26.843	.0477	1439.05
39.0	-1.838	33.394	26.876	.0489	1439.11
40.0	-1.840	33.426	26.902	.0500	1439.17
41.0	-1.842	33.493	26.957	.0511	1439.27
42.0	-1.846	33.569	27.018	.0522	1439.37
43.0	-1.849	33.652	27.086	.0532	1439.49

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
44.0	-1.849	33.694	27.120	.0541	1439.57
45.0	-1.850	33.714	27.137	.0550	1439.61
46.0	-1.849	33.720	27.141	.0560	1439.64
47.0	-1.850	33.726	27.146	.0569	1439.66
47.3	-1.848	32.790	26.385	.0571	1438.35


SALINITY (psu)
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30
31
32
33
34
35
TEMPERATURE (DEG.C)
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-1
0
1
PRESSURE (db)
0
200
400
600
800
1000
EXP 9
72-54.0 N 128-53.0 W
DATE 271179 GMT 2112
STN 2
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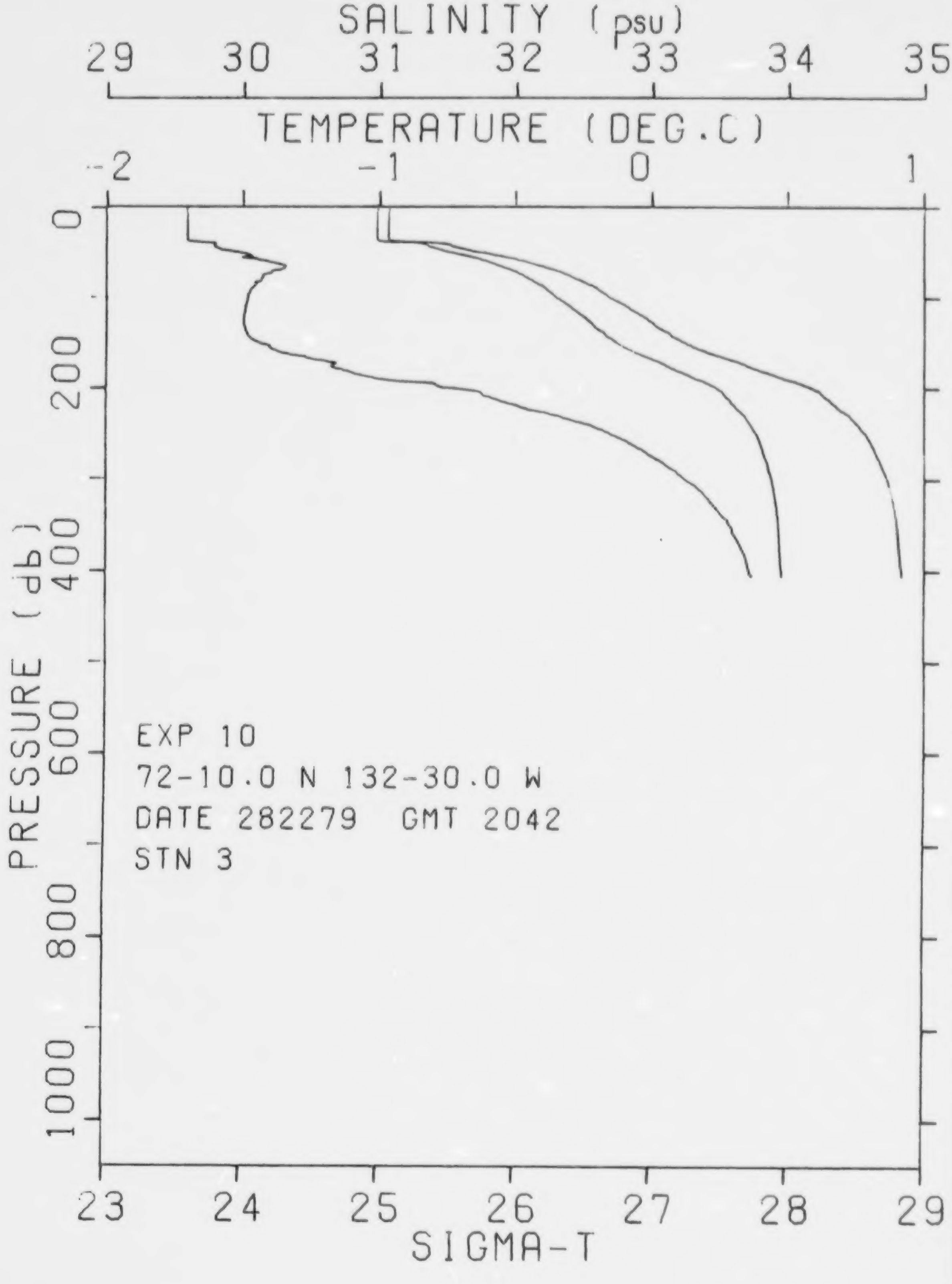
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 2 EXPERIMENT NO. 9 DATE 271179 GMT 2112
LAT. 72-54.0 N LONG. 128-53.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.1	-1.715	31.211	25.099	.0059	1436.02
3.0	-1.715	31.210	25.098	.0086	1436.03
4.0	-1.714	31.207	25.096	.0114	1436.05
5.0	-1.715	31.207	25.096	.0143	1436.06
6.0	-1.714	31.206	25.095	.0171	1436.08
7.0	-1.715	31.207	25.096	.0200	1436.09
8.0	-1.715	31.207	25.096	.0228	1436.11
9.0	-1.714	31.206	25.095	.0257	1436.13
10.0	-1.715	31.207	25.096	.0286	1436.14
11.0	-1.715	31.206	25.095	.0314	1436.16
12.0	-1.713	31.205	25.094	.0343	1436.18
13.0	-1.714	31.206	25.095	.0371	1436.19
14.0	-1.713	31.205	25.095	.0400	1436.21
15.0	-1.715	31.207	25.096	.0428	1436.22
16.0	-1.715	31.206	25.095	.0457	1436.24
17.0	-1.715	31.207	25.096	.0485	1436.26
18.0	-1.714	31.206	25.095	.0514	1436.27
19.0	-1.715	31.208	25.097	.0543	1436.29
20.0	-1.715	31.207	25.096	.0571	1436.31
21.0	-1.713	31.205	25.094	.0600	1436.33
22.0	-1.713	31.206	25.095	.0628	1436.34
23.0	-1.714	31.206	25.095	.0657	1436.36
24.0	-1.715	31.207	25.096	.0685	1436.37
25.0	-1.713	31.206	25.095	.0714	1436.39
27.5	-1.714	31.208	25.097	.0785	1436.43
30.0	-1.713	31.207	25.096	.0856	1436.48
32.5	-1.710	31.260	25.139	.0928	1436.61
35.0	-1.692	31.621	25.432	.0994	1437.24
37.5	-1.672	31.774	25.555	.1056	1437.59
40.0	-1.645	31.892	25.651	.1115	1437.93
42.5	-1.604	31.974	25.717	.1172	1438.28
45.0	-1.573	32.040	25.769	.1228	1438.56
47.5	-1.577	32.090	25.810	.1283	1438.65
50.0	-1.691	32.147	25.859	.1337	1438.23
55.0	-1.714	32.211	25.912	.1442	1438.29
60.0	-1.668	32.261	25.951	.1544	1438.66
65.0	-1.529	32.307	25.986	.1645	1439.47
70.0	-1.535	32.385	26.049	.1744	1439.63
75.0	-1.486	32.459	26.108	.1840	1440.05
80.0	-1.510	32.524	26.161	.1933	1440.11
85.0	-1.512	32.576	26.204	.2024	1440.26
90.0	-1.497	32.654	26.267	.2112	1440.52
95.0	-1.498	32.717	26.318	.2198	1440.68

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.499	32.779	26.368	.2281	1440.85
105.0	-1.501	32.830	26.409	.2362	1440.99
110.0	-1.501	32.887	26.455	.2441	1441.15
115.0	-1.502	32.941	26.500	.2518	1441.31
120.0	-1.501	32.986	26.536	.2592	1441.46
125.0	-1.497	33.054	26.591	.2665	1441.65
130.0	-1.490	33.123	26.647	.2735	1441.97
135.0	-1.485	33.165	26.681	.2802	1442.03
140.0	-1.475	33.232	26.736	.2866	1442.26
145.0	-1.459	33.300	26.790	.2932	1442.51
150.0	-1.431	33.370	26.846	.2992	1442.82
155.0	-1.378	33.480	26.934	.3049	1443.31
160.0	-1.326	33.568	27.003	.3102	1443.76
165.0	-1.249	33.678	27.091	.3152	1444.36
170.0	-1.168	33.791	27.179	.3198	1444.98
175.0	-1.060	33.896	27.261	.3239	1445.71
180.0	-.958	33.981	27.326	.3277	1446.39
185.0	-.834	34.077	27.399	.3312	1447.18
190.0	-.694	34.170	27.469	.3343	1448.05
195.0	-.605	34.232	27.515	.3372	1448.63
200.0	-.489	34.295	27.561	.3398	1449.33
210.0	-.378	34.384	27.628	.3446	1450.13
220.0	-.252	34.469	27.690	.3488	1451.00
230.0	-.134	34.554	27.753	.3524	1451.82
240.0	-.043	34.619	27.801	.3556	1452.49
250.0	.028	34.662	27.832	.3583	1453.04
260.0	.111	34.714	27.869	.3607	1453.66
270.0	.167	34.744	27.890	.3629	1454.12
280.0	.176	34.767	27.909	.3648	1454.35
290.0	.248	34.790	27.923	.3666	1454.86
300.0	.287	34.804	27.932	.3683	1455.24
310.0	.299	34.814	27.940	.3699	1455.47
320.0	.289	34.822	27.947	.3715	1455.60
330.0	.317	34.830	27.952	.3730	1455.90
340.0	.320	34.837	27.957	.3744	1456.09
350.0	.321	34.843	27.962	.3758	1456.27
360.0	.332	34.848	27.965	.3772	1456.46
370.0	.331	34.854	27.970	.3785	1456.65
380.0	.324	34.857	27.972	.3798	1456.79
390.0	.330	34.861	27.975	.3811	1456.98
400.0	.310	34.863	27.979	.3824	1457.06
411.0	.299	34.866	27.982	.3837	1457.19


SALINITY (psu)
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30
31
32
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35
TEMPERATURE (DEG.C)
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-1
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PRESSURE (db)
0
200
400
600
800
1000
EXP 10
72-10.0 N 132-30.0 W
DATE 282279 GMT 2042
STN 3
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SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 3 EXPERIMENT NO. 10 DATE 282279 GMT 2042
LAT. 72-10.0 N LONG. 132-30.0 W

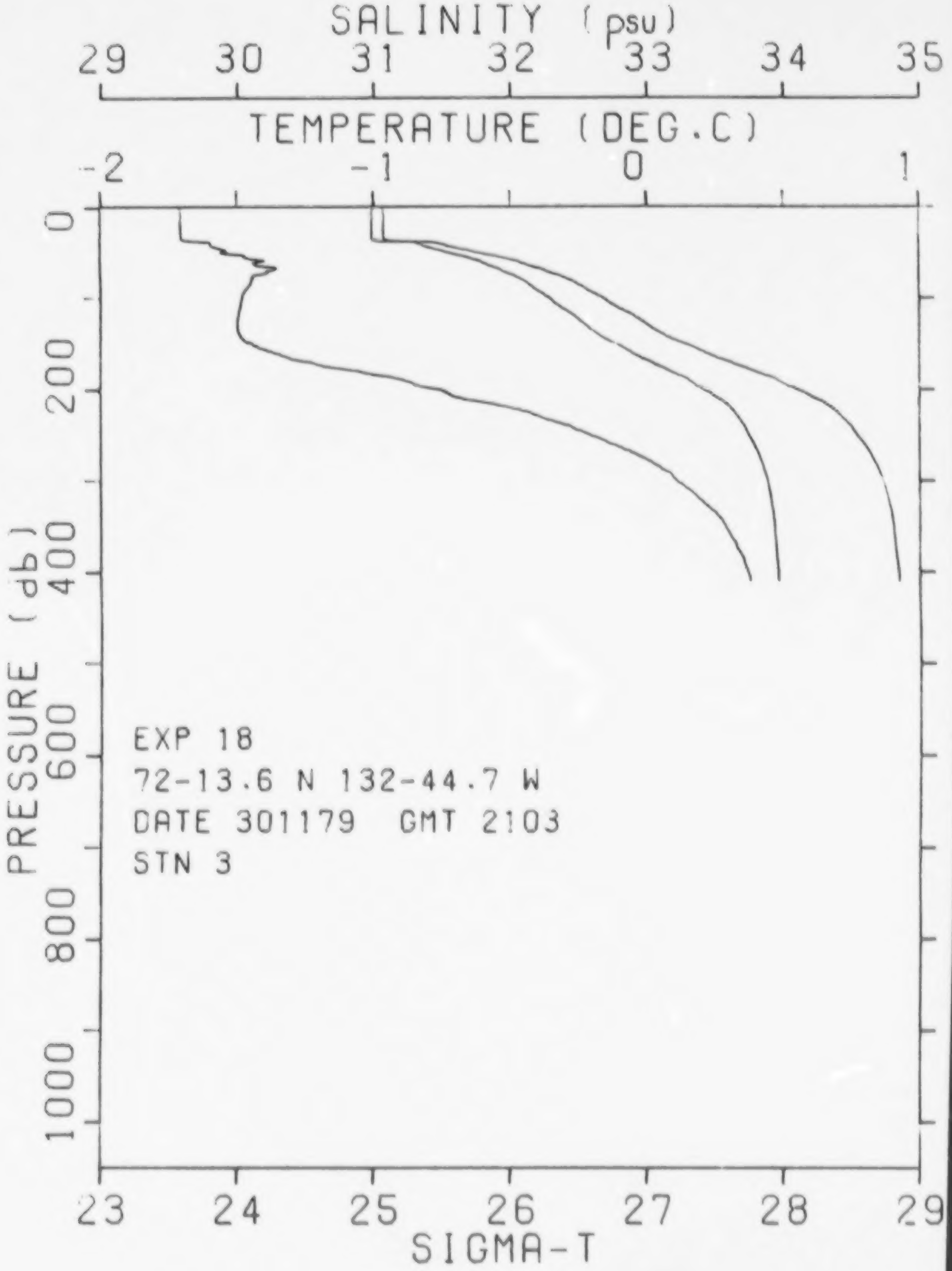
PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
1.9	-1.706	31.067	24.982	.0057	1435.86
2.0	-1.706	31.066	24.982	.0059	1435.86
3.0	-1.705	31.065	24.981	.0089	1435.88
4.0	-1.706	31.065	24.981	.0119	1435.89
5.0	-1.705	31.064	24.980	.0148	1435.91
6.0	-1.706	31.063	24.979	.0178	1435.92
7.0	-1.705	31.063	24.979	.0208	1435.94
8.0	-1.706	31.063	24.979	.0237	1435.95
9.0	-1.706	31.063	24.978	.0267	1435.97
10.0	-1.705	31.061	24.977	.0297	1435.98
11.0	-1.705	31.062	24.978	.0326	1436.00
12.0	-1.705	31.061	24.977	.0356	1436.02
13.0	-1.705	31.061	24.977	.0386	1436.03
14.0	-1.706	31.062	24.978	.0415	1436.05
15.0	-1.706	31.062	24.978	.0445	1436.06
16.0	-1.705	31.061	24.977	.0475	1436.08
17.0	-1.706	31.061	24.977	.0504	1436.10
18.0	-1.705	31.061	24.977	.0534	1436.11
19.0	-1.705	31.060	24.976	.0564	1436.13
20.0	-1.706	31.061	24.977	.0593	1436.14
21.0	-1.706	31.061	24.977	.0623	1436.16
22.0	-1.706	31.061	24.977	.0653	1436.18
23.0	-1.704	31.059	24.976	.0682	1436.20
24.0	-1.705	31.060	24.976	.0712	1436.21
25.0	-1.706	31.061	24.977	.0742	1436.23
27.5	-1.705	31.060	24.977	.0816	1436.27
30.0	-1.706	31.062	24.978	.0890	1436.31
32.5	-1.705	31.060	24.976	.0964	1436.35
35.0	-1.705	31.062	24.978	.1038	1436.39
37.5	-1.705	31.066	24.981	.1113	1436.44
40.0	-1.606	31.417	25.265	.1184	1437.45
42.5	-1.608	31.519	25.347	.1250	1437.62
45.0	-1.605	31.555	25.376	.1315	1437.73
47.5	-1.582	31.641	25.446	.1379	1438.00
50.0	-1.521	31.715	25.504	.1441	1438.43
55.0	-1.466	31.902	25.655	.1561	1439.03
60.0	-1.412	32.052	25.776	.1674	1439.59
65.0	-1.341	32.175	25.873	.1781	1440.17
70.0	-1.365	32.290	25.967	.1885	1440.30
75.0	-1.424	32.372	26.036	.1984	1440.22
80.0	-1.434	32.445	26.095	.2080	1440.36
85.0	-1.449	32.521	26.157	.2174	1440.48
90.0	-1.467	32.591	26.214	.2264	1440.57

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
95.0	-1.476	32.641	26.255	.2353	1440.66
100.0	-1.482	32.686	26.292	.2439	1440.80
105.0	-1.485	32.746	26.341	.2524	1440.95
110.0	-1.493	32.814	26.396	.2606	1441.09
115.0	-1.492	32.862	26.435	.2685	1441.24
120.0	-1.496	32.920	26.482	.2763	1441.36
125.0	-1.498	32.974	26.526	.2838	1441.54
130.0	-1.497	33.016	26.561	.2912	1441.68
135.0	-1.492	33.062	26.598	.2984	1441.85
140.0	-1.485	33.133	26.655	.3053	1442.07
145.0	-1.476	33.170	26.685	.3121	1442.24
150.0	-1.445	33.240	26.741	.3186	1442.57
155.0	-1.403	33.308	26.795	.3249	1442.95
160.0	-1.372	33.400	26.868	.3309	1443.30
165.0	-1.302	33.494	26.943	.3366	1443.85
170.0	-1.209	33.607	27.031	.3418	1444.53
175.0	-1.172	33.695	27.102	.3467	1444.90
180.0	-1.133	33.784	27.172	.3513	1445.29
185.0	-1.088	33.893	27.259	.3555	1445.74
190.0	-1.005	33.975	27.323	.3593	1446.33
195.0	-.805	34.091	27.409	.3627	1447.50
200.0	-.761	34.176	27.476	.3658	1447.91
210.0	-.597	34.271	27.546	.3713	1448.97
220.0	-.490	34.358	27.612	.3763	1449.75
230.0	-.346	34.451	27.681	.3806	1450.69
240.0	-.235	34.516	27.727	.3844	1451.47
250.0	-.155	34.571	27.768	.3878	1452.07
260.0	-.083	34.611	27.797	.3909	1452.63
270.0	-.022	34.641	27.818	.3937	1453.11
280.0	.032	34.676	27.843	.3963	1453.57
290.0	.084	34.701	27.860	.3987	1454.00
300.0	.123	34.730	27.881	.4009	1454.39
310.0	.173	34.750	27.895	.4029	1454.81
320.0	.204	34.765	27.905	.4049	1455.13
330.0	.233	34.780	27.916	.4068	1455.45
340.0	.259	34.792	27.924	.4085	1455.75
350.0	.285	34.801	27.930	.4102	1456.04
360.0	.302	34.806	27.933	.4119	1456.29
370.0	.324	34.813	27.937	.4135	1456.56
380.0	.337	34.819	27.941	.4151	1456.79
390.0	.350	34.824	27.945	.4167	1457.02
400.0	.357	34.833	27.952	.4182	1457.23
407.0	.369	34.837	27.954	.4193	1457.41

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 3 EXPERIMENT NO. 11 DATE 281179 GMT 2129
LAT. 72-10.0 N LONG. 132-30.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)	
2.1	-1.705	30.670	24.660	.0071	1435.31	?
3.0	-1.705	30.778	24.747	.0099	1435.47	
4.0	-1.705	30.882	24.832	.0131	1435.63	
5.0	-1.705	30.964	24.899	.0162	1435.77	
6.0	-1.705	30.998	24.926	.0192	1435.83	
7.0	-1.705	31.022	24.946	.0222	1435.88	
8.0	-1.705	31.033	24.954	.0252	1435.91	
9.0	-1.705	31.051	24.969	.0282	1435.96	
10.0	-1.705	31.056	24.973	.0312	1435.98	?
11.0	-1.705	31.061	24.977	.0341	1436.00	
12.0	-1.705	31.063	24.979	.0371	1436.02	
13.0	-1.705	31.065	24.980	.0401	1436.04	
14.0	-1.705	31.066	24.981	.0430	1436.06	
15.0	-1.705	31.063	24.979	.0460	1436.07	
16.0	-1.706	31.060	24.976	.0490	1436.08	
17.0	-1.705	31.062	24.978	.0519	1436.10	
18.0	-1.705	31.062	24.978	.0549	1436.12	
19.0	-1.705	31.061	24.976	.0579	1436.13	
20.0	-1.705	31.062	24.978	.0608	1436.15	
21.0	-1.704	31.060	24.976	.0638	1436.17	
22.0	-1.704	31.061	24.977	.0668	1436.19	
23.0	-1.704	31.061	24.977	.0697	1436.20	
24.0	-1.704	31.060	24.977	.0727	1436.22	
25.0	-1.704	31.061	24.977	.0757	1436.23	
27.5	-1.704	31.060	24.976	.0831	1436.27	
30.0	-1.704	31.060	24.976	.0905	1436.32	
32.5	-1.703	31.060	24.977	.0979	1436.36	
35.0	-1.704	31.058	24.975	.1053	1436.40	
37.5	-1.703	31.059	24.975	.1128	1436.44	
40.0	-1.686	31.127	25.030	.1202	1436.66	
42.5	-1.594	31.490	25.323	.1270	1437.65	
45.0	-1.584	31.546	25.369	.1336	1437.81	
47.5	-1.569	31.619	25.428	.1400	1438.03	
50.0	-1.550	31.695	25.489	.1462	1438.27	
55.0	-1.429	31.874	25.631	.1583	1439.17	
60.0	-1.377	32.056	25.778	.1697	1439.76	
65.0	-1.344	32.206	25.899	.1803	1440.21	
70.0	-1.395	32.316	25.990	.1905	1440.20	
75.0	-1.411	32.408	26.065	.2003	1440.34	
80.0	-1.438	32.472	26.117	.2099	1440.38	
85.0	-1.459	32.543	26.176	.2191	1440.46	
90.0	-1.462	32.594	26.217	.2281	1440.60	
95.0	-1.478	32.648	26.261	.2369	1440.68	

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.478	32.696	26.300	.2455	1440.83
105.0	-1.485	32.744	26.339	.2540	1440.95
110.0	-1.492	32.807	26.391	.2622	1441.09
115.0	-1.494	32.864	26.437	.2701	1441.24
120.0	-1.498	32.924	26.486	.2779	1441.38
125.0	-1.500	32.979	26.531	.2854	1441.54
130.0	-1.498	33.020	26.564	.2928	1441.68
135.0	-1.492	33.071	26.605	.2999	1441.87
140.0	-1.493	33.134	26.656	.3069	1442.03
145.0	-1.479	33.193	26.703	.3136	1442.26
150.0	-1.451	33.264	26.760	.3201	1442.58
155.0	-1.410	33.339	26.820	.3263	1442.96
160.0	-1.367	33.426	26.889	.3322	1443.37
165.0	-1.291	33.526	26.968	.3377	1443.95
170.0	-1.204	33.628	27.048	.3428	1444.58
175.0	-1.154	33.703	27.108	.3477	1445.00
180.0	-1.100	33.783	27.170	.3522	1445.45
185.0	-1.043	33.904	27.267	.3563	1445.97
190.0	-1.002	33.993	27.337	.3601	1446.37
195.0	-.836	34.076	27.398	.3636	1447.34
200.0	-.762	34.142	27.449	.3667	1447.86
210.0	-.619	34.276	27.551	.3724	1448.87
220.0	-.488	34.379	27.629	.3772	1449.79
230.0	-.359	34.464	27.692	.3814	1450.66
240.0	-.255	34.527	27.737	.3850	1451.39
250.0	-.157	34.587	27.781	.3883	1452.09
260.0	-.102	34.623	27.808	.3912	1452.56
270.0	-.041	34.656	27.830	.3939	1453.04
280.0	.013	34.685	27.851	.3964	1453.49
290.0	.070	34.721	27.877	.3987	1453.97
300.0	.119	34.745	27.894	.4008	1454.39
310.0	.163	34.767	27.909	.4027	1454.79
320.0	.192	34.778	27.917	.4046	1455.09
330.0	.223	34.796	27.929	.4063	1455.42
340.0	.250	34.810	27.939	.4080	1455.73
350.0	.276	34.817	27.943	.4095	1456.02
360.0	.293	34.826	27.949	.4111	1456.27
370.0	.315	34.835	27.956	.4125	1456.55
380.0	.331	34.840	27.958	.4140	1456.80
390.0	.353	34.847	27.963	.4154	1457.07
400.0	.371	34.855	27.968	.4166	1457.32
403.9	.377	34.852	27.965	.4173	1457.41


SALINITY (psu)
29 30 31 32 33 34 35
TEMPERATURE (DEG.C)
-2 -1 0 1
PRESSURE (db)
0 200 400 600 800 1000
EXP 18
72-13.6 N 132-44.7 W
DATE 301179 GMT 2103
STN 3
23 24 25 26 27 28 29
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 3 EXPERIMENT NO. 18 DATE 301179 GMT 2103
LAT. 72-13.6 N LONG. 132-44.7 W

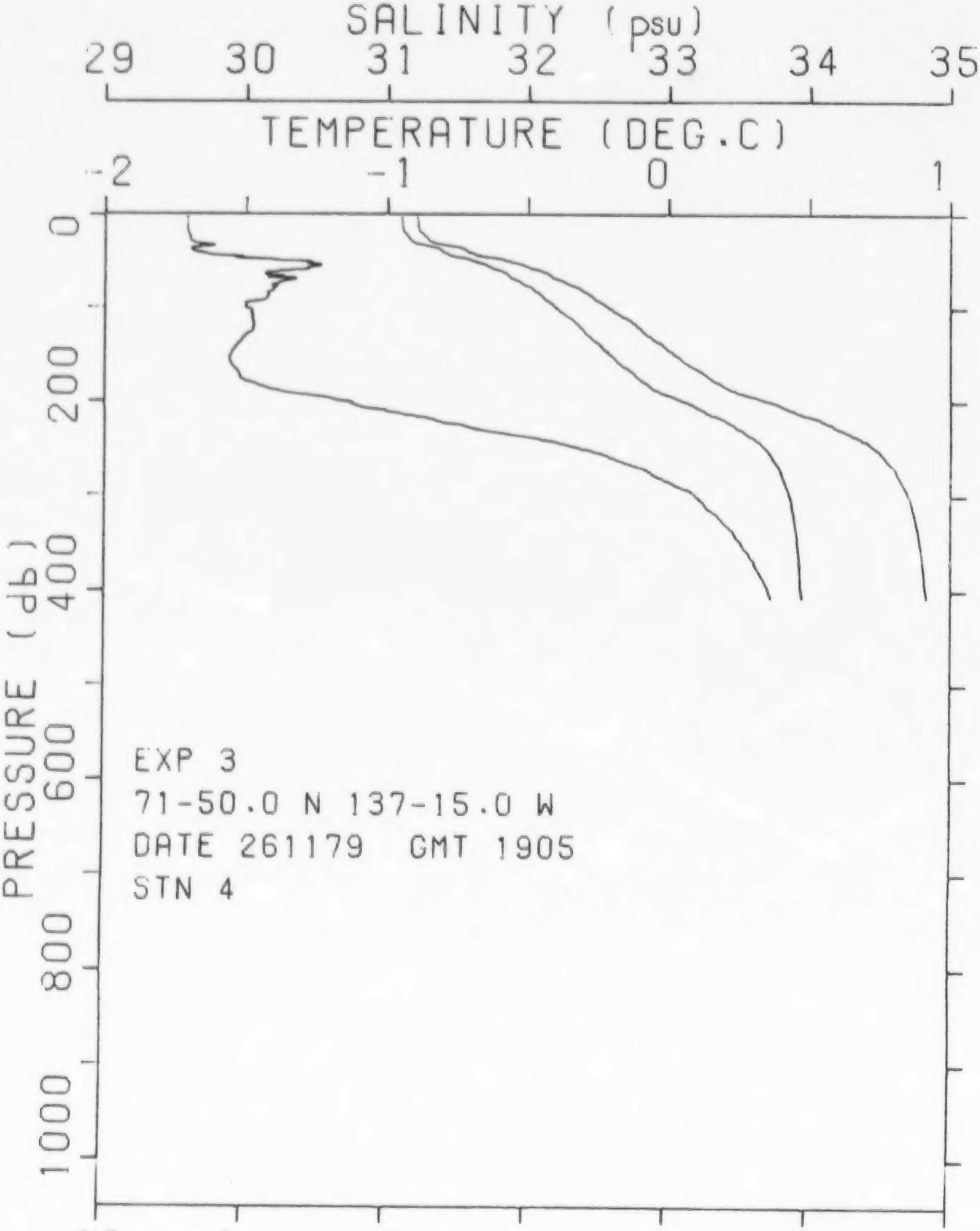
PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.0	-1.708	31.074	24.988	.0059	1435.86
2.0	-1.708	31.074	24.988	.0059	1435.85
3.0	-1.708	31.075	24.989	.0089	1435.88
4.0	-1.707	31.074	24.988	.0118	1435.89
5.0	-1.706	31.073	24.987	.0148	1435.91
6.0	-1.708	31.075	24.989	.0178	1435.93
7.0	-1.706	31.074	24.987	.0207	1435.95
8.0	-1.705	31.071	24.986	.0237	1435.97
9.0	-1.706	31.073	24.987	.0266	1435.98
10.0	-1.707	31.075	24.989	.0296	1435.99
11.0	-1.705	31.072	24.986	.0325	1436.02
12.0	-1.707	31.073	24.987	.0355	1436.03
13.0	-1.707	31.073	24.987	.0385	1436.04
14.0	-1.707	31.074	24.987	.0414	1436.06
15.0	-1.705	31.072	24.986	.0444	1436.08
16.0	-1.706	31.072	24.986	.0473	1436.10
17.0	-1.706	31.073	24.987	.0503	1436.11
18.0	-1.707	31.073	24.987	.0533	1436.12
19.0	-1.705	31.071	24.985	.0562	1436.14
20.0	-1.705	31.071	24.986	.0592	1436.16
21.0	-1.707	31.074	24.988	.0621	1436.17
22.0	-1.706	31.073	24.987	.0651	1436.19
23.0	-1.705	31.071	24.986	.0681	1436.21
24.0	-1.707	31.073	24.987	.0710	1436.22
25.0	-1.706	31.072	24.986	.0740	1436.24
27.5	-1.707	31.073	24.987	.0814	1436.28
30.0	-1.707	31.073	24.987	.0888	1436.32
32.5	-1.706	31.072	24.986	.0961	1436.37
35.0	-1.706	31.074	24.988	.1035	1436.41
37.5	-1.696	31.092	25.002	.1109	1436.52
40.0	-1.596	31.468	25.306	.1178	1437.56
42.5	-1.595	31.531	25.357	.1244	1437.70
45.0	-1.583	31.596	25.410	.1306	1437.89
47.5	-1.552	31.673	25.471	.1372	1438.19
50.0	-1.546	31.748	25.532	.1433	1438.35
55.0	-1.467	31.915	25.666	.1552	1439.05
60.0	-1.392	32.058	25.780	.1664	1439.69
65.0	-1.431	32.145	25.852	.1773	1439.71
70.0	-1.372	32.255	25.939	.1877	1440.22
75.0	-1.425	32.342	26.012	.1978	1440.18
80.0	-1.442	32.429	26.083	.2075	1440.30
85.0	-1.451	32.494	26.135	.2169	1440.43
90.0	-1.464	32.551	26.182	.2261	1440.53

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
95.0	-1.477	32.616	26.235	.2351	1440.64
100.0	-1.482	32.680	26.288	.2436	1440.79
105.0	-1.485	32.723	26.322	.2523	1440.92
110.0	-1.489	32.760	26.368	.2606	1441.06
115.0	-1.493	32.848	26.424	.2687	1441.22
120.0	-1.495	32.909	26.474	.2765	1441.36
125.0	-1.499	32.960	26.515	.2841	1441.51
130.0	-1.500	33.011	26.557	.2915	1441.66
135.0	-1.498	33.056	26.593	.2987	1441.82
140.0	-1.491	33.123	26.647	.3057	1442.03
145.0	-1.482	33.185	26.697	.3124	1442.24
150.0	-1.446	33.270	26.765	.3189	1442.61
155.0	-1.422	33.357	26.835	.3250	1442.93
160.0	-1.367	33.427	26.891	.3309	1443.37
165.0	-1.319	33.508	26.955	.3365	1443.79
170.0	-1.230	33.605	27.031	.3417	1444.42
175.0	-1.181	33.683	27.092	.3466	1444.85
180.0	-1.062	33.777	27.165	.3512	1445.62
185.0	-.970	33.872	27.238	.3554	1446.26
190.0	-.888	33.967	27.312	.3593	1446.86
195.0	-.846	34.026	27.358	.3630	1447.21
200.0	-.760	34.099	27.414	.3663	1447.81
210.0	-.678	34.232	27.518	.3723	1448.54
220.0	-.500	34.356	27.611	.3773	1449.70
230.0	-.393	34.434	27.668	.3817	1450.46
240.0	-.282	34.501	27.717	.3855	1451.23
250.0	-.206	34.544	27.748	.3891	1451.81
260.0	-.128	34.594	27.785	.3922	1452.39
270.0	-.047	34.640	27.818	.3951	1453.00
280.0	.019	34.675	27.843	.3977	1453.51
290.0	.069	34.704	27.864	.4001	1453.94
300.0	.107	34.734	27.886	.4023	1454.32
310.0	.154	34.751	27.897	.4043	1454.72
320.0	.190	34.769	27.910	.4062	1455.07
330.0	.228	34.786	27.921	.4080	1455.43
340.0	.263	34.799	27.929	.4098	1455.77
350.0	.287	34.808	27.936	.4114	1456.06
360.0	.304	34.814	27.939	.4130	1456.31
370.0	.325	34.820	27.943	.4146	1456.58
380.0	.345	34.826	27.947	.4162	1456.84
390.0	.353	34.838	27.956	.4177	1457.06
400.0	.368	34.844	27.960	.4191	1457.29
410.0	.379	34.848	27.962	.4205	1457.51

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 3 EXPERIMENT NO. 19 DATE 301179 GMT 2120
LAT. 72-13.6 N LONG. 132-44.7 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
1.4	-1.706	31.073	24.987	.0042	1435.86
2.0	-1.707	31.073	24.987	.0059	1435.86
3.0	-1.707	31.073	24.987	.0089	1435.88
4.0	-1.707	31.074	24.987	.0118	1435.90
5.0	-1.706	31.073	24.987	.0148	1435.92
6.0	-1.706	31.073	24.987	.0178	1435.93
7.0	-1.706	31.073	24.987	.0207	1435.95
8.0	-1.706	31.072	24.986	.0237	1435.96
9.0	-1.707	31.074	24.988	.0266	1435.98
10.0	-1.706	31.073	24.987	.0296	1436.00
11.0	-1.706	31.073	24.987	.0326	1436.01
12.0	-1.705	31.072	24.986	.0355	1436.03
13.0	-1.707	31.073	24.987	.0385	1436.04
14.0	-1.706	31.072	24.986	.0414	1436.06
15.0	-1.706	31.072	24.986	.0444	1436.08
16.0	-1.706	31.072	24.986	.0474	1436.09
17.0	-1.707	31.074	24.987	.0503	1436.11
18.0	-1.705	31.071	24.985	.0533	1436.13
19.0	-1.705	31.071	24.985	.0562	1436.15
20.0	-1.706	31.072	24.986	.0592	1436.16
21.0	-1.706	31.072	24.986	.0621	1436.18
22.0	-1.707	31.074	24.988	.0651	1436.19
23.0	-1.707	31.073	24.987	.0681	1436.21
24.0	-1.706	31.072	24.986	.0710	1436.23
25.0	-1.706	31.073	24.987	.0740	1436.24
27.5	-1.705	31.072	24.986	.0814	1436.28
30.0	-1.707	31.073	24.987	.0888	1436.32
32.5	-1.706	31.073	24.987	.0962	1436.36
35.0	-1.706	31.072	24.986	.1036	1436.40
37.5	-1.706	31.073	24.987	.1109	1436.45
40.0	-1.686	31.111	25.018	.1183	1436.63
42.5	-1.596	31.468	25.306	.1252	1437.61
45.0	-1.592	31.537	25.361	.1317	1437.76
47.5	-1.580	31.599	25.412	.1381	1437.95
50.0	-1.552	31.670	25.469	.1445	1438.22
55.0	-1.506	31.821	25.590	.1567	1438.73
60.0	-1.417	32.021	25.751	.1682	1439.52
65.0	-1.431	32.135	25.844	.1791	1439.69
70.0	-1.395	32.267	25.949	.1895	1440.13
75.0	-1.443	32.370	26.034	.1995	1440.13
80.0	-1.439	32.429	26.083	.2092	1440.32
85.0	-1.452	32.504	26.144	.2186	1440.44
90.0	-1.470	32.569	26.195	.2277	1440.53

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
95.0	-1.479	32.638	26.253	.2366	1440.67
100.0	-1.480	32.687	26.292	.2452	1440.81
105.0	-1.486	32.746	26.341	.2537	1440.94
110.0	-1.490	32.804	26.388	.2619	1441.09
115.0	-1.494	32.867	26.440	.2699	1441.24
120.0	-1.496	32.920	26.492	.2776	1441.39
125.0	-1.499	32.962	26.517	.2852	1441.52
130.0	-1.499	33.011	26.557	.2926	1441.67
135.0	-1.497	33.059	26.595	.2998	1441.83
140.0	-1.495	33.103	26.631	.3068	1441.96
145.0	-1.484	33.171	26.686	.3136	1442.21
150.0	-1.460	33.251	26.750	.3201	1442.52
155.0	-1.424	33.332	26.815	.3263	1442.88
160.0	-1.381	33.395	26.865	.3323	1443.26
165.0	-1.330	33.469	26.924	.3380	1443.68
170.0	-1.252	33.572	27.004	.3433	1444.28
175.0	-1.176	33.675	27.086	.3483	1444.86
180.0	-1.084	33.757	27.149	.3529	1445.49
185.0	-.996	33.847	27.219	.3573	1446.10
190.0	-.906	33.941	27.292	.3612	1446.74
195.0	-.859	34.009	27.345	.3650	1447.13
200.0	-.794	34.078	27.398	.3684	1447.62
210.0	-.707	34.220	27.510	.3745	1448.38
220.0	-.505	34.352	27.606	.3796	1449.67
230.0	-.381	34.440	27.673	.3840	1450.53
240.0	-.263	34.508	27.723	.3878	1451.33
250.0	-.170	34.561	27.761	.3912	1452.00
260.0	-.109	34.605	27.793	.3943	1452.50
270.0	-.030	34.649	27.824	.3970	1453.09
280.0	.032	34.665	27.850	.3996	1453.58
290.0	.090	34.714	27.871	.4019	1454.05
300.0	.127	34.739	27.889	.4040	1454.42
310.0	.169	34.759	27.902	.4060	1454.80
320.0	.204	34.774	27.913	.4079	1455.14
330.0	.245	34.789	27.923	.4097	1455.51
340.0	.274	34.802	27.932	.4114	1455.83
350.0	.294	34.811	27.937	.4130	1456.10
360.0	.308	34.814	27.939	.4146	1456.33
370.0	.331	34.824	27.945	.4162	1456.61
380.0	.344	34.828	27.948	.4177	1456.84
390.0	.357	34.839	27.957	.4192	1457.07
400.0	.370	34.845	27.960	.4206	1457.30
413.9	.387	34.851	27.964	.4226	1457.62


SALINITY (psu)
29
30
31
32
33
34
35
TEMPERATURE (DEG.C)
-2
-1
0
1
PRESSURE (db)
0
200
400
600
800
1000
EXP 3
71-50.0 N 137-15.0 W
DATE 261179 GMT 1905
STN 4
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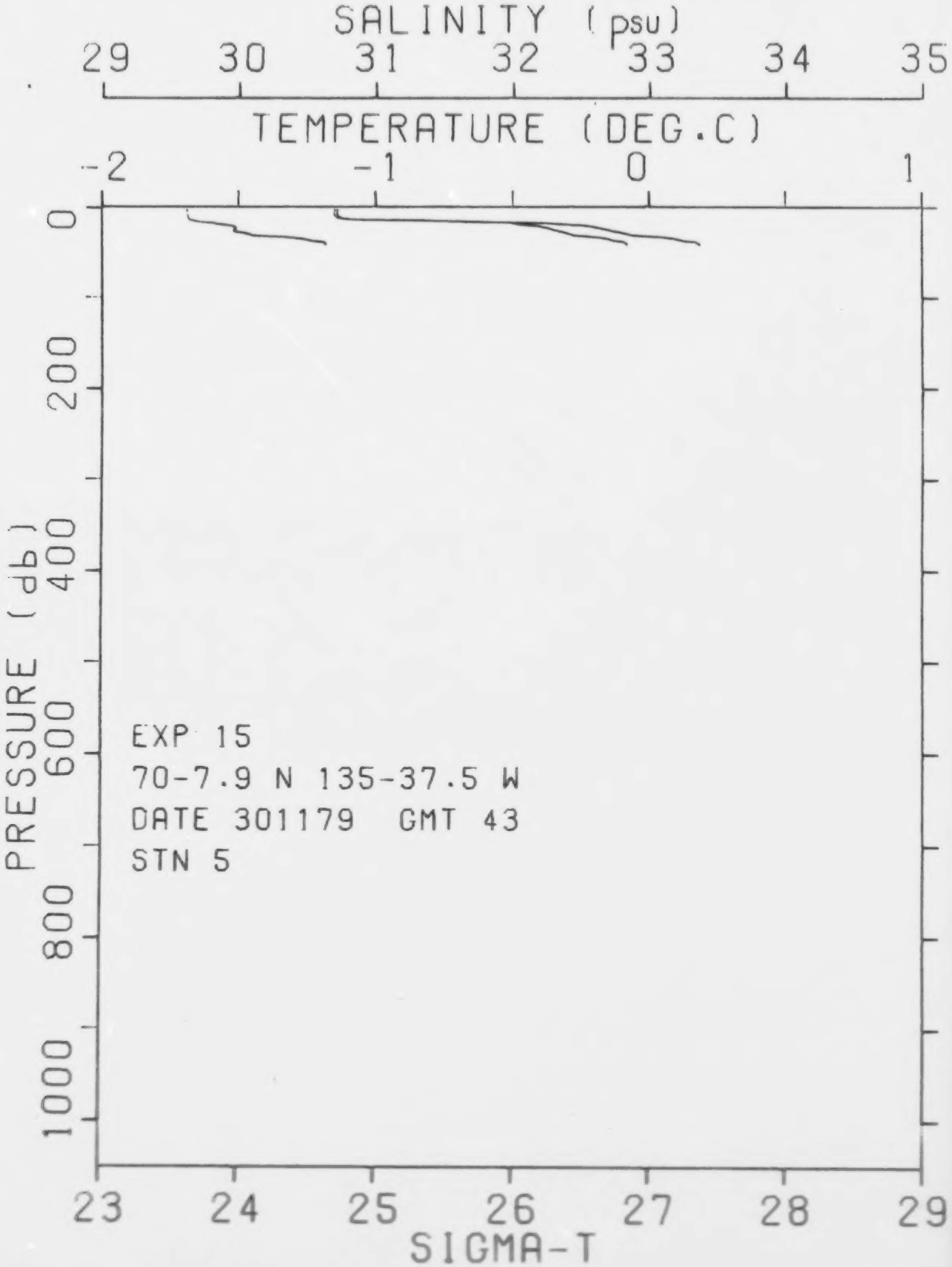
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 4 EXPERIMENT NO. 3 DATE 261179 GMT 1905
LAT. 71-50.0 N LONG. 137-15.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
3.0	-1.709	31.208	25.097	.0087	1436.06
4.0	-1.710	31.211	25.099	.0114	1436.07
5.0	-1.709	31.211	25.099	.0143	1436.10
6.0	-1.708	31.212	25.100	.0171	1436.12
7.0	-1.709	31.214	25.102	.0200	1436.13
8.0	-1.709	31.215	25.103	.0228	1436.15
9.0	-1.709	31.216	25.103	.0257	1436.17
10.0	-1.708	31.218	25.105	.0285	1436.19
11.0	-1.709	31.218	25.105	.0314	1436.20
12.0	-1.708	31.218	25.105	.0342	1436.22
13.0	-1.709	31.220	25.106	.0371	1436.24
14.0	-1.709	31.220	25.107	.0399	1436.26
15.0	-1.708	31.220	25.107	.0428	1436.28
16.0	-1.709	31.223	25.109	.0456	1436.29
17.0	-1.708	31.223	25.108	.0484	1436.31
18.0	-1.709	31.225	25.111	.0513	1436.33
19.0	-1.707	31.224	25.109	.0541	1436.35
20.0	-1.705	31.236	25.119	.0570	1436.39
21.0	-1.703	31.254	25.134	.0598	1436.44
22.0	-1.702	31.257	25.136	.0626	1436.47
23.0	-1.702	31.259	25.138	.0654	1436.49
24.0	-1.696	31.271	25.147	.0682	1436.54
25.0	-1.698	31.275	25.151	.0710	1436.57
27.5	-1.698	31.288	25.162	.0780	1436.62
30.0	-1.690	31.313	25.182	.0850	1436.74
32.5	-1.652	31.373	25.229	.0919	1437.04
35.0	-1.667	31.489	25.324	.0986	1437.18
37.5	-1.696	31.547	25.372	.1051	1437.16
40.0	-1.685	31.569	25.390	.1116	1437.29
42.5	-1.645	31.607	25.419	.1180	1437.57
45.0	-1.563	31.651	25.453	.1243	1438.06
47.5	-1.533	31.785	25.562	.1304	1438.43
50.0	-1.368	31.842	25.604	.1364	1439.33
55.0	-1.231	31.980	25.713	.1480	1440.25
60.0	-1.314	32.069	25.787	.1592	1440.07
65.0	-1.428	32.158	25.862	.1699	1439.79
70.0	-1.322	32.211	25.902	.1805	1440.40
75.0	-1.388	32.290	25.968	.1907	1440.28
80.0	-1.401	32.375	26.038	.2007	1440.42
85.0	-1.425	32.427	26.081	.2103	1440.46
90.0	-1.427	32.473	26.118	.2198	1440.60
95.0	-1.501	32.524	26.161	.2291	1440.40
100.0	-1.505	32.576	26.203	.2382	1440.54

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
105.0	-1.475	32.622	26.240	.2471	1440.82
110.0	-1.474	32.681	26.288	.2558	1440.99
115.0	-1.476	32.739	26.335	.2642	1441.15
120.0	-1.470	32.780	26.368	.2725	1441.31
125.0	-1.476	32.817	26.398	.2806	1441.42
130.0	-1.502	32.853	26.428	.2886	1441.43
135.0	-1.513	32.903	26.469	.2963	1441.53
140.0	-1.530	32.965	26.520	.3039	1441.62
145.0	-1.542	32.992	26.542	.3113	1441.66
150.0	-1.552	33.046	26.586	.3186	1441.79
155.0	-1.558	33.092	26.624	.3256	1441.91
160.0	-1.555	33.135	26.659	.3325	1442.07
165.0	-1.542	33.196	26.708	.3392	1442.30
170.0	-1.525	33.255	26.756	.3456	1442.54
175.0	-1.518	33.293	26.786	.3519	1442.71
180.0	-1.493	33.346	26.828	.3580	1442.98
185.0	-1.438	33.413	26.881	.3639	1443.42
190.0	-1.374	33.491	26.943	.3695	1443.92
195.0	-1.259	33.601	27.028	.3747	1444.69
200.0	-1.158	33.714	27.116	.3796	1445.41
210.0	-1.000	33.864	27.249	.3882	1446.55
220.0	-.833	34.079	27.401	.3955	1447.77
230.0	-.679	34.217	27.506	.4017	1448.84
240.0	-.461	34.363	27.614	.4068	1450.21
250.0	-.318	34.462	27.688	.4110	1451.18
260.0	-.204	34.533	27.739	.4146	1451.96
270.0	-.105	34.595	27.785	.4179	1452.67
280.0	-.043	34.629	27.809	.4208	1453.16
290.0	.032	34.666	27.835	.4235	1453.72
300.0	.098	34.699	27.858	.4259	1454.23
310.0	.128	34.726	27.878	.4281	1454.57
320.0	.174	34.743	27.890	.4302	1454.96
330.0	.200	34.758	27.900	.4322	1455.27
340.0	.233	34.772	27.909	.4341	1455.60
350.0	.260	34.783	27.917	.4360	1455.90
360.0	.284	34.793	27.923	.4377	1456.19
370.0	.305	34.802	27.929	.4395	1456.46
380.0	.323	34.807	27.932	.4411	1456.71
390.0	.341	34.814	27.938	.4428	1456.97
400.0	.352	34.824	27.945	.4444	1457.20
408.5	.365	34.831	27.949	.4457	1457.40


SALINITY (psu)
29
30
31
32
33
34
35
TEMPERATURE (DEG.C)
-2
-1
0
1
PRESSURE (db)
0
200
400
600
800
1000
EXP 15
70-7.9 N 135-37.5 W
DATE 301179 GMT 43
STN 5
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SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 5 EXPERIMENT NO. 15 DATE 301179 GMT 43
LAT. 70-07.9 N LONG. 135-37.5 W

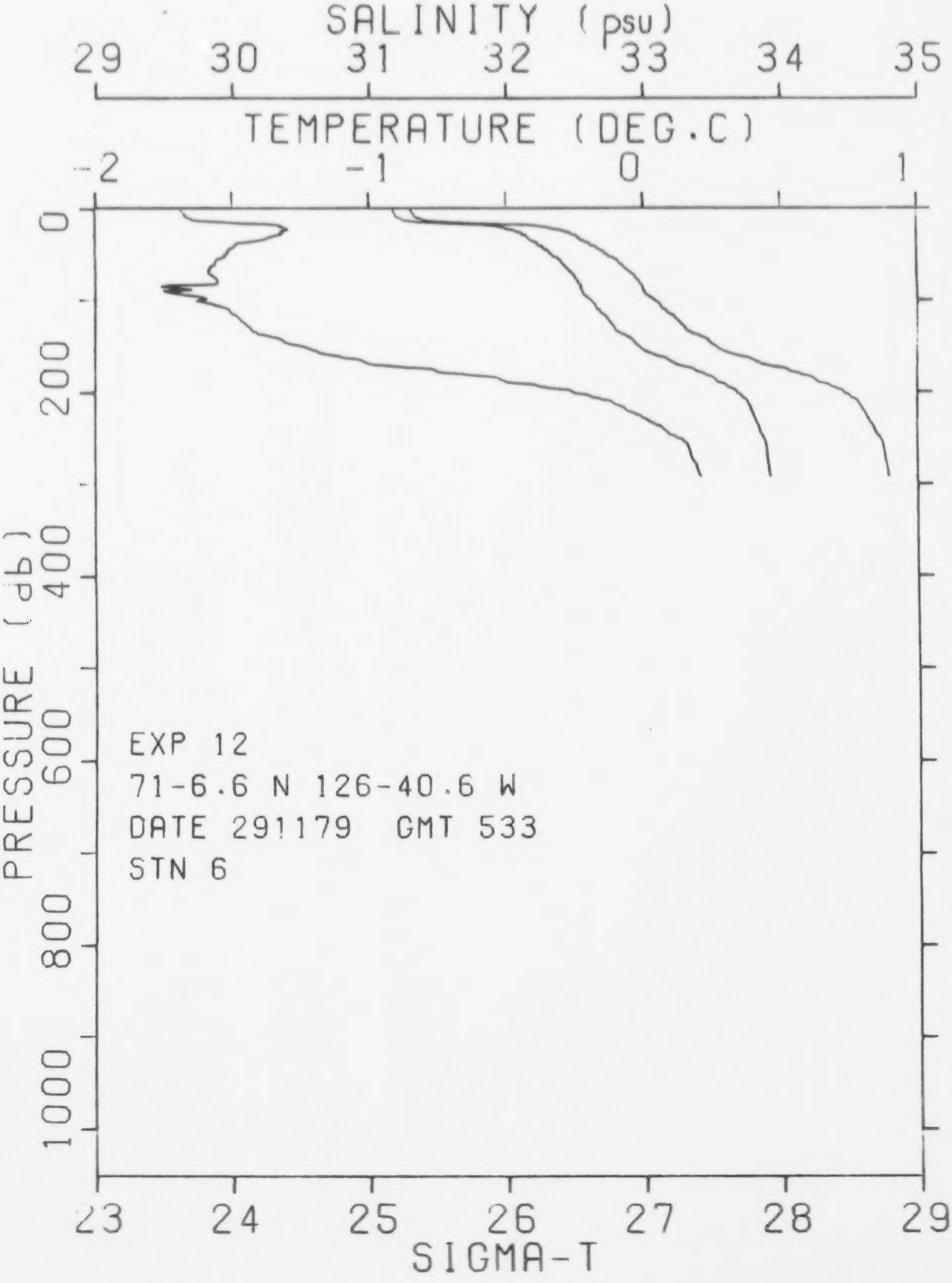
PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
3.0	-1.689	30.723	24.702	.0098	1435.46
4.0	-1.687	30.720	24.700	.0129	1435.49
5.0	-1.687	30.718	24.698	.0162	1435.51
6.0	-1.687	30.716	24.697	.0194	1435.52
7.0	-1.688	30.716	24.697	.0226	1435.53
8.0	-1.687	30.718	24.698	.0259	1435.55
9.0	-1.687	30.721	24.700	.0291	1435.58
10.0	-1.687	30.723	24.703	.0323	1435.60
11.0	-1.686	30.728	24.707	.0356	1435.63
12.0	-1.685	30.741	24.717	.0388	1435.66
13.0	-1.685	30.752	24.726	.0420	1435.69
14.0	-1.680	30.828	24.788	.0452	1435.84
15.0	-1.678	31.179	25.073	.0482	1436.36
16.0	-1.654	31.663	25.466	.0509	1437.17
17.0	-1.631	31.912	25.667	.0533	1437.65
18.0	-1.593	32.241	25.934	.0554	1438.31
19.0	-1.575	32.346	26.019	.0575	1438.56
20.0	-1.548	32.438	26.092	.0594	1438.83
21.0	-1.530	32.526	26.164	.0613	1439.05
22.0	-1.514	32.583	26.209	.0631	1439.23
23.0	-1.507	32.620	26.239	.0649	1439.33
24.0	-1.505	32.649	26.263	.0666	1439.39
25.0	-1.511	32.701	26.305	.0684	1439.46
26.0	-1.514	32.717	26.318	.0701	1439.48
27.0	-1.517	32.733	26.331	.0717	1439.51
28.0	-1.500	32.777	26.367	.0734	1439.67
29.0	-1.474	32.813	26.395	.0750	1439.85
30.0	-1.465	32.827	26.406	.0767	1439.93
31.0	-1.456	32.860	26.433	.0783	1440.04
32.0	-1.442	32.891	26.458	.0798	1440.17
33.0	-1.370	33.002	26.546	.0813	1440.68
34.0	-1.300	33.129	26.646	.0828	1441.20
35.0	-1.282	33.168	26.677	.0841	1441.36
36.0	-1.259	33.208	26.709	.0855	1441.54
37.0	-1.240	33.234	26.730	.0868	1441.68
38.0	-1.227	33.268	26.757	.088	1441.81
39.0	-1.189	33.341	26.815	.0893	1442.11
40.0	-1.181	33.364	26.834	.0905	1442.19
41.0	-1.182	33.370	26.839	.0917	1442.21
42.0	-1.191	33.372	26.840	.0929	1442.23
42.7	-1.182	33.374	26.841	.093	1442.24

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 5 EXPERIMENT NO. 16 DATE 301179 GMT 51
LAT. 70-07.9 N LONG. 135-37.5 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
1.4	-1.687	30.723	24.702	.0044	1435.45
2.0	-1.687	30.723	24.702	.0065	1435.46
3.0	-1.687	30.721	24.701	.0097	1435.48
4.0	-1.687	30.721	24.700	.0129	1435.50
5.0	-1.687	30.722	24.701	.0162	1435.51
6.0	-1.687	30.722	24.702	.0194	1435.53
7.0	-1.687	30.722	24.702	.0226	1435.55
8.0	-1.687	30.722	24.702	.0259	1435.56
9.0	-1.687	30.724	24.703	.0291	1435.58
10.0	-1.686	30.729	24.707	.0323	1435.61
11.0	-1.685	30.738	24.714	.0355	1435.64
12.0	-1.684	30.747	24.722	.0387	1435.66
13.0	-1.681	30.794	24.760	.0419	1435.77
14.0	-1.677	30.951	24.887	.0451	1436.03
15.0	-1.681	31.456	25.298	.0479	1436.74
16.0	-1.648	31.755	25.540	.0504	1437.33
17.0	-1.614	32.008	25.745	.0528	1437.86
18.0	-1.591	32.241	25.933	.0549	1438.32
19.0	-1.572	32.364	26.033	.0569	1438.59
20.0	-1.544	32.450	26.102	.0589	1438.87
21.0	-1.524	32.538	26.173	.0607	1439.10
22.0	-1.509	32.593	26.217	.0625	1439.27
23.0	-1.499	32.630	26.247	.0643	1439.38
24.0	-1.496	32.669	26.279	.0661	1439.47
25.0	-1.480	32.708	26.310	.0678	1439.61
26.0	-1.525	32.737	26.335	.0695	1439.46
27.0	-1.490	32.760	26.353	.0711	1439.67
28.0	-1.476	32.802	26.386	.0728	1439.81
29.0	-1.471	32.821	26.401	.0744	1439.88
30.0	-1.455	32.851	26.425	.0760	1440.02
31.0	-1.443	32.881	26.449	.0776	1440.13
32.0	-1.425	32.932	26.490	.0791	1440.30
33.0	-1.379	32.989	26.535	.0806	1440.61
34.0	-1.333	33.063	26.594	.0821	1440.95
35.0	-1.270	33.176	26.684	.0835	1441.43
36.0	-1.240	33.236	26.732	.0848	1441.66
37.0	-1.213	33.286	26.772	.0861	1441.88
38.0	-1.191	33.337	26.812	.0873	1442.07
39.0	-1.185	33.358	26.829	.0885	1442.14
39.1	-1.185	33.358	26.829	.0887	1442.15

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 5 EXPERIMENT NO. 17
LAT. 70-07.9 N LONG. 135-37.5 W DATE 301179 GMT 55

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
1.5	-1.687	30.723	24.702	.0046	1435.46
2.0	-1.687	30.722	24.702	.0065	1435.46
3.0	-1.687	30.722	24.702	.0097	1435.48
4.0	-1.686	30.721	24.701	.0129	1435.50
5.0	-1.687	30.722	24.701	.0162	1435.51
6.0	-1.687	30.722	24.702	.0194	1435.53
7.0	-1.687	30.722	24.702	.0226	1435.55
8.0	-1.686	30.722	24.702	.0258	1435.57
9.0	-1.687	30.725	24.704	.0291	1435.58
10.0	-1.686	30.725	24.704	.0323	1435.61
11.0	-1.685	30.740	24.716	.0355	1435.65
12.0	-1.686	30.747	24.722	.0387	1435.67
13.0	-1.684	30.763	24.735	.0419	1435.72
14.0	-1.679	30.868	24.820	.0451	1435.90
15.0	-1.680	31.365	25.224	.0481	1436.61
16.0	-1.650	31.724	25.515	.0507	1437.28
17.0	-1.615	31.990	25.730	.0531	1437.83
18.0	-1.587	32.256	25.946	.0552	1438.35
19.0	-1.572	32.363	26.032	.0572	1438.59
20.0	-1.543	32.458	26.108	.0591	1438.88
21.0	-1.522	32.551	26.184	.0610	1439.13
22.0	-1.506	32.592	26.216	.0628	1439.28
23.0	-1.498	32.626	26.244	.0646	1439.38
24.0	-1.497	32.652	26.265	.0663	1439.44
25.0	-1.491	32.699	26.303	.0680	1439.55
26.0	-1.520	32.726	26.325	.0697	1439.47
27.0	-1.519	32.736	26.334	.0714	1439.50
28.0	-1.499	32.769	26.360	.0731	1439.66
29.0	-1.473	32.807	26.390	.0747	1439.85
30.0	-1.465	32.829	26.408	.0763	1439.93
31.0	-1.446	32.872	26.442	.0779	1440.10
32.0	-1.439	32.904	26.468	.0795	1440.20
33.0	-1.386	32.978	26.527	.0810	1440.57
34.0	-1.308	33.102	26.625	.0825	1441.13
35.0	-1.290	33.148	26.662	.0839	1441.29
36.0	-1.243	33.225	26.723	.0852	1441.64
37.0	-1.205	33.299	26.781	.0865	1441.94
38.0	-1.183	33.354	26.826	.0877	1442.14
39.0	-1.181	33.364	26.834	.0889	1442.17
40.0	-1.181	33.367	26.836	.0901	1442.19
41.0	-1.181	33.368	26.837	.0913	1442.21
41.5	-1.181	33.357	26.828	.0919	1442.20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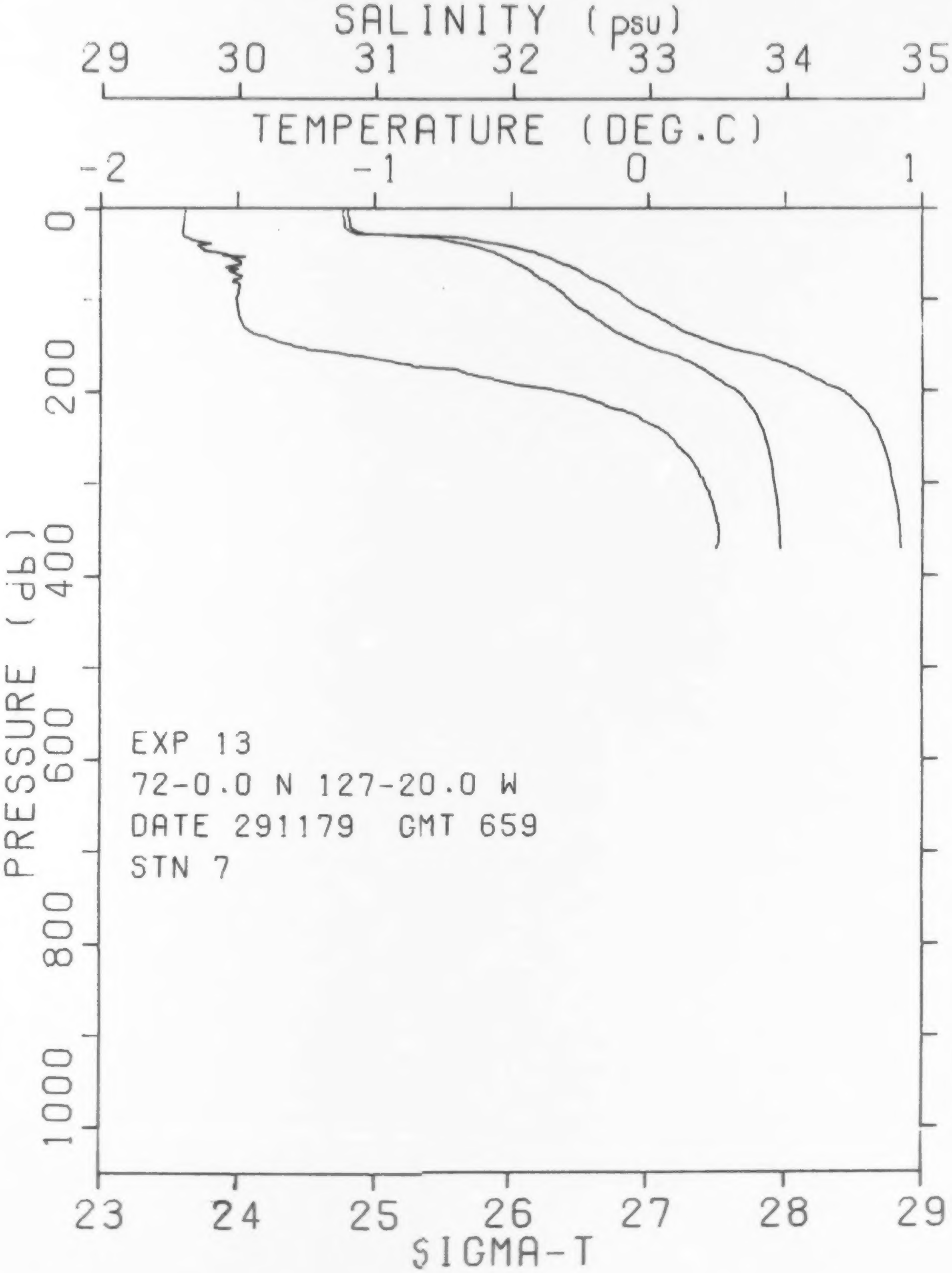
EXP 12
71-6.6 N 126-40.6 W
DATE 291179 GMT 533
STN 6
23 24 25 26 27 28 29
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 6 EXPERIMENT NO. 12 DATE 291179 GMT 533
LAT. 71-06.6 N LONG. 126-40.6 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.1	-1.684	31.307	25.177	.0058	1436.30
3.0	-1.685	31.309	25.179	.0083	1436.31
4.0	-1.683	31.307	25.176	.0111	1436.33
5.0	-1.678	31.321	25.188	.0139	1436.39
6.0	-1.671	31.337	25.201	.0167	1436.47
7.0	-1.674	31.328	25.194	.0194	1436.46
8.0	-1.666	31.342	25.205	.0222	1436.53
9.0	-1.673	31.332	25.197	.0249	1436.50
10.0	-1.669	31.340	25.203	.0277	1436.55
11.0	-1.657	31.367	25.225	.0304	1436.66
12.0	-1.645	31.390	25.244	.0332	1436.76
13.0	-1.642	31.401	25.252	.0359	1436.81
14.0	-1.624	31.434	25.279	.0386	1436.96
15.0	-1.567	31.503	25.333	.0412	1437.34
16.0	-1.513	31.661	25.460	.0438	1437.84
17.0	-1.416	31.855	25.616	.0462	1438.59
18.0	-1.357	32.032	25.758	.0485	1439.13
19.0	-1.315	32.208	25.900	.0507	1439.59
20.0	-1.324	32.259	25.942	.0527	1439.64
21.0	-1.319	32.303	25.977	.0548	1439.74
22.0	-1.306	32.333	26.001	.0568	1439.86
23.0	-1.290	32.359	26.021	.0588	1439.99
24.0	-1.292	32.400	26.055	.0607	1440.05
25.0	-1.317	32.426	26.076	.0626	1439.98
27.5	-1.315	32.474	26.116	.0674	1440.10
30.0	-1.343	32.509	26.145	.0721	1440.06
32.5	-1.367	32.533	26.165	.0767	1440.03
35.0	-1.390	32.553	26.182	.0813	1439.98
37.5	-1.465	32.596	26.218	.0858	1439.73
40.0	-1.485	32.619	26.238	.0902	1439.71
42.5	-1.491	32.661	26.272	.0946	1439.78
45.0	-1.513	32.681	26.288	.0989	1439.75
47.5	-1.511	32.715	26.316	.1032	1439.84
50.0	-1.517	32.726	26.325	.1074	1439.87
55.0	-1.543	32.801	26.387	.1157	1439.93
60.0	-1.559	32.830	26.411	.1238	1439.98
65.0	-1.579	32.867	26.442	.1317	1440.03
70.0	-1.590	32.913	26.479	.1395	1440.12
75.0	-1.565	32.947	26.506	.1471	1440.37
80.0	-1.550	32.977	26.530	.1546	1440.56
85.0	-1.761	32.999	26.553	.1620	1439.67
90.0	-1.752	33.014	26.565	.1693	1439.82
95.0	-1.656	33.033	26.579	.1765	1440.38

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.615	33.089	26.623	.1836	1440.74
105.0	-1.564	33.128	26.653	.1906	1441.12
110.0	-1.515	33.148	26.668	.1974	1441.46
115.0	-1.498	33.198	26.708	.2040	1441.69
120.0	-1.472	33.244	26.745	.2105	1441.96
125.0	-1.453	33.277	26.771	.2168	1442.17
130.0	-1.432	33.308	26.795	.2231	1442.40
135.0	-1.414	33.341	26.822	.2292	1442.61
140.0	-1.353	33.429	26.891	.2351	1443.11
145.0	-1.308	33.486	26.936	.2406	1443.48
150.0	-1.242	33.532	26.972	.2461	1443.94
155.0	-1.190	33.584	27.012	.2513	1444.34
160.0	-1.127	33.683	27.090	.2563	1444.85
165.0	-1.028	33.807	27.188	.2608	1445.58
170.0	-.985	33.874	27.240	.2650	1445.95
175.0	-.768	34.044	27.369	.2688	1447.28
180.0	-.676	34.138	27.442	.2721	1447.92
185.0	-.524	34.248	27.524	.2750	1448.86
190.0	-.490	34.282	27.551	.2777	1449.15
195.0	-.360	34.386	27.629	.2801	1449.97
200.0	-.254	34.467	27.689	.2821	1450.66
210.0	-.117	34.569	27.764	.2857	1451.59
220.0	-.061	34.606	27.791	.2888	1452.07
230.0	.015	34.650	27.823	.2916	1452.64
240.0	.075	34.691	27.852	.2942	1453.13
250.0	.122	34.731	27.882	.2964	1453.57
260.0	.165	34.758	27.902	.2985	1453.96
268.0	.174	34.761	27.904	.3000	1454.14
269.0	.174	34.765	27.907	.3002	1454.16
270.0	.175	34.764	27.906	.3004	1454.18
271.0	.176	34.765	27.907	.3006	1454.20
272.0	.178	34.766	27.907	.3008	1454.23
273.0	.179	34.768	27.909	.3009	1454.25
274.0	.180	34.768	27.909	.3011	1454.28
275.0	.182	34.770	27.911	.3013	1454.30
276.0	.183	34.772	27.913	.3015	1454.33
277.0	.187	34.772	27.912	.3017	1454.36
278.0	.191	34.775	27.914	.3019	1454.40
279.0	.196	34.778	27.916	.3020	1454.44
280.0	.195	34.779	27.917	.3022	1454.46
281.0	.196	34.781	27.918	.3024	1454.48
282.0	.197	34.782	27.919	.3026	1454.50
283.0	.197	34.782	27.920	.3028	1454.52
284.0	.198	34.782	27.920	.3029	1454.54
285.0	.199	34.784	27.921	.3031	1454.56
286.0	.200	34.783	27.920	.3033	1454.59
287.0	.200	34.785	27.922	.3035	1454.60
288.0	.202	34.785	27.922	.3036	1454.63
289.0	.204	34.786	27.923	.3038	1454.65

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
289.0	.204	34.786	27.923	.3038	1454.65
290.0	.204	34.788	27.924	.3040	1454.67
291.0	.207	34.790	27.925	.3042	1454.70
292.0	.211	34.792	27.927	.3043	1454.74
292.6	.212	34.793	27.928	.3044	1454.76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30
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32
33
34
35
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PRESSURE (db)
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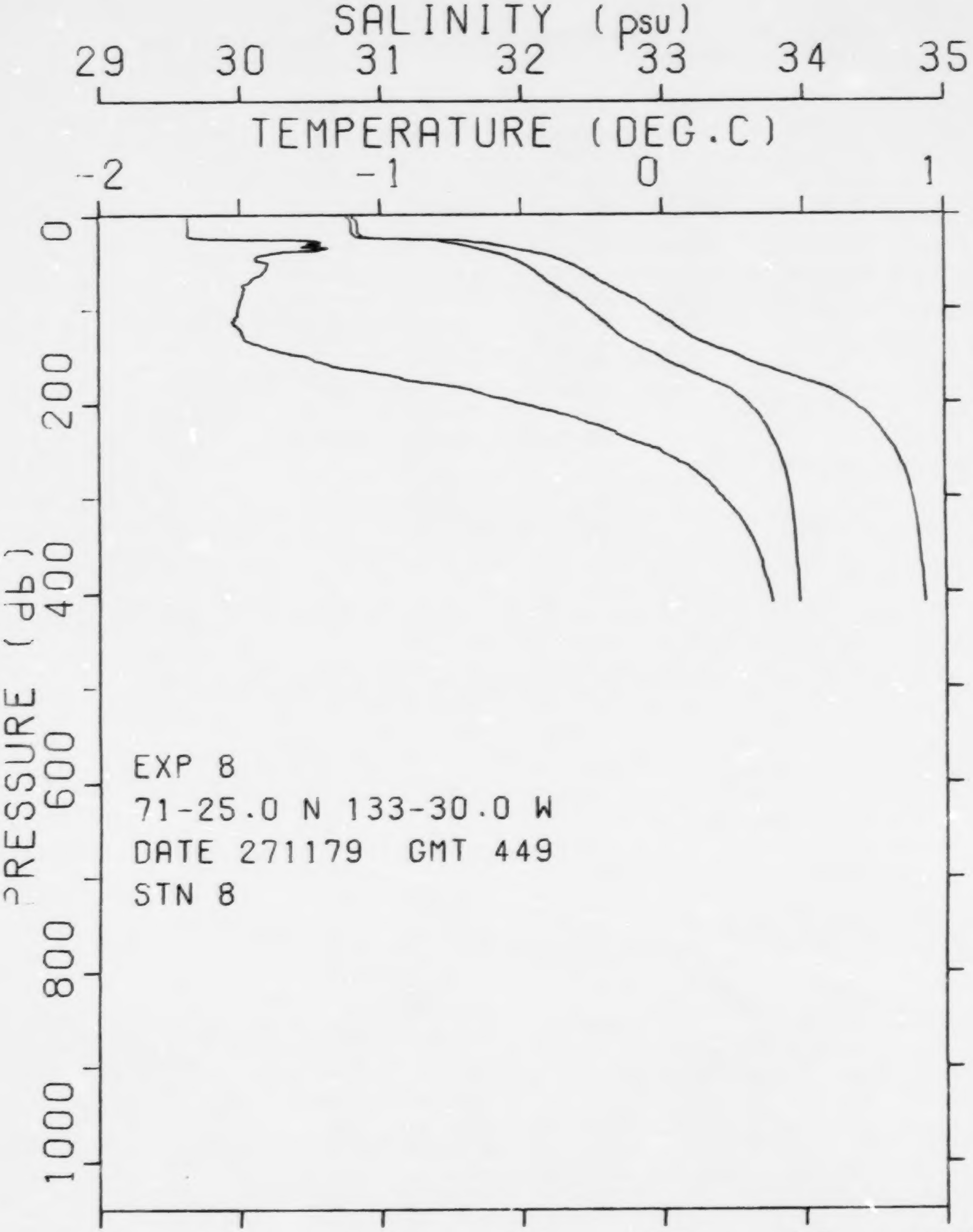
200
400
600
800
1000
EXP 13
72-0.0 N 127-20.0 W
DATE 291179 GMT 659
STN 7
23
24
25
26
27
28
29
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 7 EXPERIMENT NO. 13 DATE 291179 GMT 659
LAT. 72-00.0 N LONG. 127-20.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.0	-1.691	30.804	24.768	.0063	1435.56
2.0	-1.691	30.804	24.768	.0063	1435.55
3.0	-1.691	30.807	24.771	.0095	1435.58
4.0	-1.691	30.806	24.769	.0127	1435.60
5.0	-1.692	30.808	24.772	.0158	1435.61
6.0	-1.692	30.806	24.770	.0190	1435.62
7.0	-1.692	30.806	24.770	.0222	1435.64
8.0	-1.693	30.808	24.771	.0253	1435.65
9.0	-1.692	30.807	24.771	.0285	1435.67
10.0	-1.694	30.810	24.773	.0317	1435.69
11.0	-1.693	30.817	24.778	.0348	1435.71
12.0	-1.694	30.817	24.778	.0380	1435.73
13.0	-1.695	30.819	24.780	.0411	1435.74
14.0	-1.695	30.820	24.781	.0443	1435.76
15.0	-1.696	30.820	24.781	.0474	1435.77
16.0	-1.695	30.822	24.783	.0506	1435.80
17.0	-1.696	30.823	24.784	.0538	1435.81
18.0	-1.696	30.823	24.783	.0569	1435.82
19.0	-1.696	30.819	24.780	.0601	1435.84
20.0	-1.697	30.818	24.780	.0632	1435.85
21.0	-1.698	30.832	24.791	.0664	1435.88
22.0	-1.696	30.830	24.789	.0695	1435.90
23.0	-1.698	30.850	24.806	.0727	1435.93
24.0	-1.698	30.850	24.806	.0758	1435.95
25.0	-1.699	30.863	24.816	.0789	1435.98
27.5	-1.700	30.917	24.860	.0867	1436.09
30.0	-1.698	31.277	25.152	.0940	1436.65
32.5	-1.685	31.643	25.450	.1005	1437.27
35.0	-1.664	31.719	25.511	.1067	1437.51
37.5	-1.635	31.814	25.587	.1127	1437.83
40.0	-1.632	31.936	25.686	.1186	1438.05
42.5	-1.633	32.015	25.751	.1242	1438.20
45.0	-1.625	32.069	25.795	.1297	1438.36
47.5	-1.583	32.151	25.860	.1351	1438.71
50.0	-1.547	32.194	25.894	.1404	1438.98
55.0	-1.524	32.292	25.973	.1507	1439.31
60.0	-1.494	32.357	26.025	.1607	1439.63
65.0	-1.547	32.446	26.099	.1703	1439.58
70.0	-1.526	32.511	26.151	.1797	1439.85
75.0	-1.480	32.563	26.192	.1888	1440.23
80.0	-1.499	32.629	26.246	.1977	1440.31
85.0	-1.487	32.703	26.306	.2064	1440.55
90.0	-1.500	32.760	26.352	.2147	1440.66

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
95.0	-1.496	32.811	26.394	.2229	1440.83
100.0	-1.506	32.850	26.425	.2309	1440.92
105.0	-1.502	32.891	26.459	.2388	1441.06
110.0	-1.498	32.948	26.506	.2464	1441.26
115.0	-1.494	33.028	26.570	.2538	1441.47
120.0	-1.491	33.081	26.613	.2609	1441.64
125.0	-1.485	33.143	26.663	.2678	1441.84
130.0	-1.477	33.205	26.713	.2745	1442.04
135.0	-1.456	33.257	26.755	.2810	1442.30
140.0	-1.409	33.347	26.827	.2872	1442.73
145.0	-1.358	33.438	26.899	.2930	1443.18
150.0	-1.300	33.531	26.973	.2986	1443.66
155.0	-1.247	33.633	27.053	.3037	1444.14
160.0	-1.106	33.782	27.170	.3084	1445.09
165.0	-.993	33.892	27.255	.3125	1445.86
170.0	-.899	33.983	27.326	.3164	1446.50
175.0	-.779	34.061	27.383	.3199	1447.25
180.0	-.670	34.134	27.438	.3231	1447.94
185.0	-.601	34.195	27.485	.3262	1448.43
190.0	-.525	34.271	27.543	.3290	1448.97
195.0	-.435	34.325	27.582	.3315	1449.55
200.0	-.335	34.412	27.648	.3338	1450.21
210.0	-.208	34.495	27.709	.3378	1451.07
220.0	-.114	34.570	27.765	.3412	1451.77
230.0	-.026	34.619	27.800	.3443	1452.41
240.0	.041	34.662	27.831	.3470	1452.94
250.0	.081	34.692	27.853	.3495	1453.33
260.0	.109	34.719	27.873	.3518	1453.66
270.0	.145	34.741	27.889	.3539	1454.01
280.0	.169	34.759	27.903	.3559	1454.31
290.0	.188	34.770	27.911	.3578	1454.58
300.0	.206	34.781	27.919	.3596	1454.84
310.0	.228	34.799	27.932	.3613	1455.13
320.0	.236	34.812	27.941	.3629	1455.34
330.0	.242	34.825	27.952	.3644	1455.55
340.0	.250	34.831	27.956	.3659	1455.76
346.0	.259	34.834	27.958	.3668	1455.90
347.0	.257	34.836	27.960	.3669	1455.91
348.0	.256	34.836	27.960	.3670	1455.93
349.0	.258	34.835	27.959	.3672	1455.95
350.0	.258	34.836	27.959	.3673	1455.97
351.0	.259	34.836	27.959	.3675	1455.99
352.0	.259	34.836	27.960	.3676	1456.00
353.0	.259	34.837	27.961	.3677	1456.02
354.0	.258	34.839	27.962	.3679	1456.04
355.0	.258	34.839	27.962	.3680	1456.05
356.0	.259	34.839	27.962	.3682	1456.07
357.0	.258	34.840	27.963	.3683	1456.09
358.0	.257	34.841	27.964	.3684	1456.10

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
358.0	.257	34.841	27.964	.3684	1456.10
359.0	.259	34.841	27.964	.3686	1456.12
360.0	.258	34.841	27.963	.3687	1456.14
361.0	.258	34.841	27.963	.3689	1456.15
362.0	.259	34.839	27.962	.3690	1456.17
363.0	.258	34.841	27.964	.3691	1456.19
364.0	.259	34.841	27.963	.3693	1456.20
365.0	.258	34.841	27.964	.3694	1456.22
366.0	.258	34.842	27.964	.3695	1456.24
367.0	.258	34.841	27.964	.3697	1456.25
368.0	.252	34.844	27.967	.3698	1456.25
369.0	.248	34.847	27.969	.3699	1456.25
370.0	.249	34.845	27.967	.3701	1456.27
371.0	.248	34.846	27.969	.3702	1456.28
371.9	.247	34.847	27.969	.3703	1456.29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PRESSURE (db)
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800
1000
EXP 8
71-25.0 N 133-30.0 W
DATE 271179 GMT 449
STN 8
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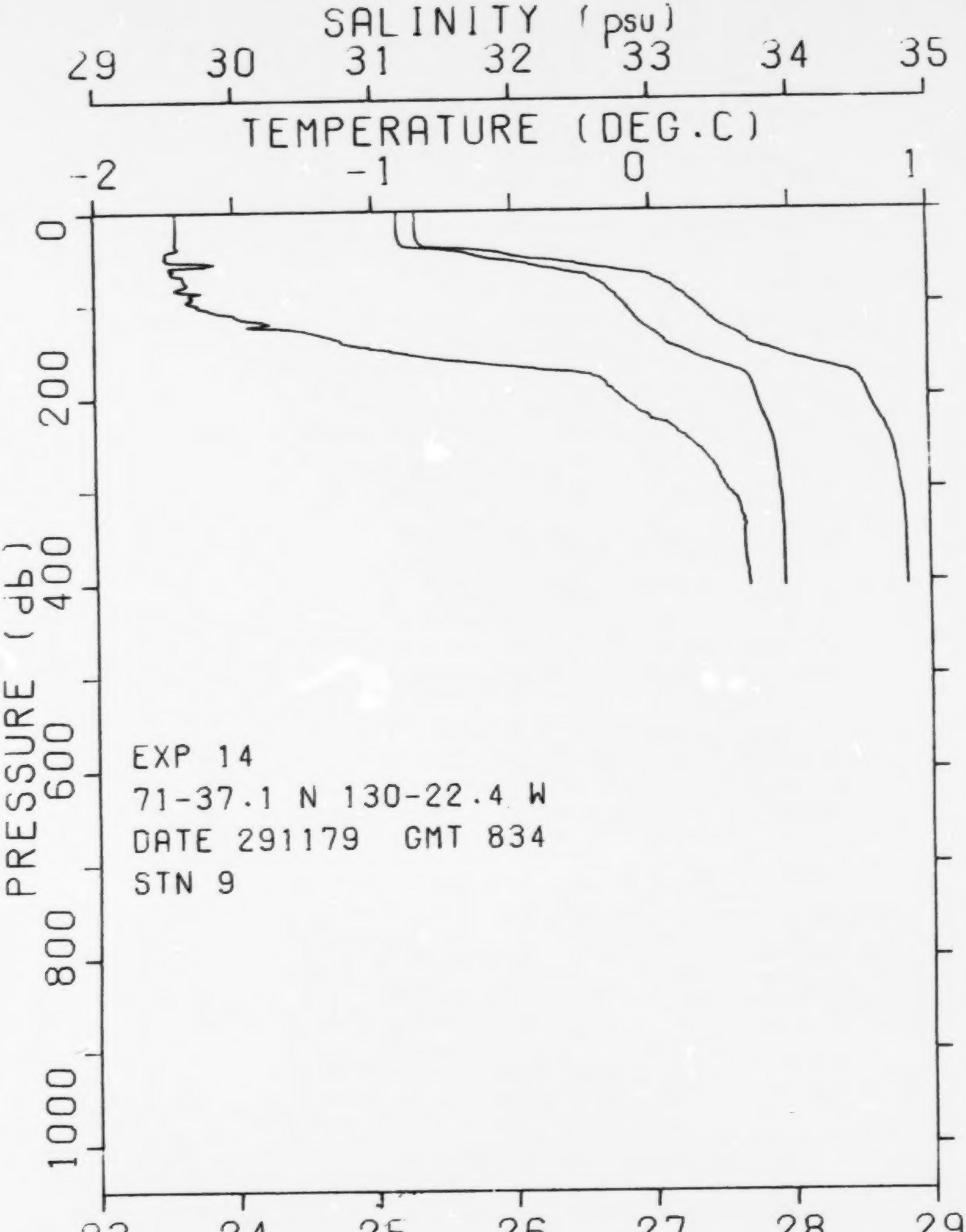
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 8 EXPERIMENT NO. 8 DATE 271179 GMT 449
LAT. 71-25.0 N LONG. 133-30.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.4	-1.685	30.803	24.767	.0075	1435.60 ?
3.0	-1.683	30.810	24.773	.0095	1435.62
4.0	-1.685	30.824	24.784	.0127	1435.65
5.0	-1.683	30.830	24.789	.0158	1435.68
6.0	-1.683	30.839	24.796	.0190	1435.71 ?
7.0	-1.683	30.839	24.797	.0221	1435.73
8.0	-1.684	30.840	24.798	.0253	1435.74
9.0	-1.684	30.841	24.798	.0284	1435.76
10.0	-1.684	30.842	24.799	.0315	1435.78
11.0	-1.684	30.843	24.800	.0347	1435.80
12.0	-1.683	30.843	24.799	.0378	1435.82
13.0	-1.683	30.842	24.799	.0410	1435.83
14.0	-1.683	30.844	24.800	.0441	1435.85
15.0	-1.682	30.843	24.800	.0472	1435.87
16.0	-1.682	30.844	24.800	.0504	1435.89
17.0	-1.683	30.845	24.801	.0535	1435.90
18.0	-1.683	30.845	24.801	.0566	1435.92
19.0	-1.683	30.845	24.801	.0598	1435.93
20.0	-1.683	30.846	24.802	.0629	1435.95
21.0	-1.684	30.856	24.810	.0660	1435.98
22.0	-1.686	30.865	24.818	.0692	1436.00
23.0	-1.681	30.880	24.830	.0723	1436.06
24.0	-1.678	30.889	24.837	.0754	1436.10
25.0	-1.603	31.048	24.965	.0784	1436.70
27.5	-1.231	31.616	25.417	.0853	1439.30
30.0	-1.212	31.731	25.510	.0915	1439.59
32.5	-1.222	31.841	25.600	.0976	1439.74
35.0	-1.183	31.938	25.677	.1034	1440.10
37.5	-1.229	31.996	25.725	.1091	1440.00
40.0	-1.351	32.093	25.807	.1146	1439.60
42.5	-1.415	32.176	25.877	.1200	1439.46
45.0	-1.443	32.230	25.921	.1252	1439.44
47.5	-1.446	32.268	25.952	.1303	1439.52
50.0	-1.414	32.318	25.992	.1354	1439.78
55.0	-1.401	32.393	26.052	.1452	1440.04
60.0	-1.411	32.454	26.102	.1548	1440.15
65.0	-1.432	32.498	26.138	.1642	1440.20
70.0	-1.457	32.551	26.182	.1734	1440.23
75.0	-1.492	32.624	26.242	.1824	1440.26
80.0	-1.480	32.671	26.280	.1911	1440.46
85.0	-1.489	32.749	26.343	.1995	1440.61
90.0	-1.494	32.816	26.398	.2078	1440.76
95.0	-1.500	32.862	26.436	.2157	1440.88

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.505	32.909	26.474	.2235	1441.01
105.0	-1.507	32.963	26.518	.2311	1441.15
110.0	-1.521	33.016	26.561	.2385	1441.25
115.0	-1.519	33.070	26.605	.2457	1441.41
120.0	-1.501	33.109	26.636	.2527	1441.63
125.0	-1.487	33.160	26.677	.2595	1441.85
130.0	-1.484	33.209	26.717	.2661	1442.02
135.0	-1.463	33.281	26.774	.2725	1442.30
140.0	-1.412	33.361	26.838	.2786	1442.73
145.0	-1.358	33.452	26.911	.2844	1443.20
150.0	-1.271	33.539	26.978	.2899	1443.81
155.0	-1.232	33.601	27.027	.2951	1444.16
160.0	-1.170	33.689	27.096	.3000	1444.66
165.0	-1.071	33.791	27.176	.3045	1445.35
170.0	-.965	33.887	27.250	.3087	1446.06
175.0	-.917	33.977	27.321	.3126	1446.49
180.0	-.790	34.083	27.402	.3161	1447.32
185.0	-.687	34.188	27.483	.3192	1448.02
190.0	-.634	34.245	27.527	.3220	1448.43
195.0	-.573	34.302	27.570	.3246	1448.88
200.0	-.507	34.349	27.606	.3270	1449.33
210.0	-.371	34.443	27.675	.3314	1450.25
220.0	-.268	34.503	27.719	.3352	1450.97
230.0	-.169	34.560	27.760	.3387	1451.67
240.0	-.109	34.601	27.790	.3418	1452.17
250.0	-.004	34.653	27.827	.3446	1452.88
260.0	.050	34.684	27.848	.3471	1453.34
270.0	.109	34.717	27.872	.3494	1453.82
280.0	.148	34.739	27.887	.3516	1454.19
290.0	.186	34.756	27.899	.3536	1454.55
300.0	.214	34.772	27.910	.3555	1454.86
310.0	.243	34.784	27.919	.3573	1455.17
320.0	.272	34.796	27.927	.3591	1455.48
330.0	.292	34.806	27.934	.3608	1455.75
340.0	.313	34.814	27.939	.3624	1456.02
350.0	.329	34.819	27.942	.3640	1456.26
360.0	.343	34.826	27.947	.3655	1456.50
370.0	.354	34.831	27.950	.3670	1456.72
380.0	.359	34.840	27.957	.3685	1456.92
390.0	.373	34.845	27.960	.3699	1457.15
400.0	.381	34.850	27.964	.3713	1457.36
411.4	.388	34.856	27.968	.3729	1457.59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400
600
800
1000
EXP 14
71-37.1 N 130-22.4 W
DATE 291179 GMT 834
STN 9
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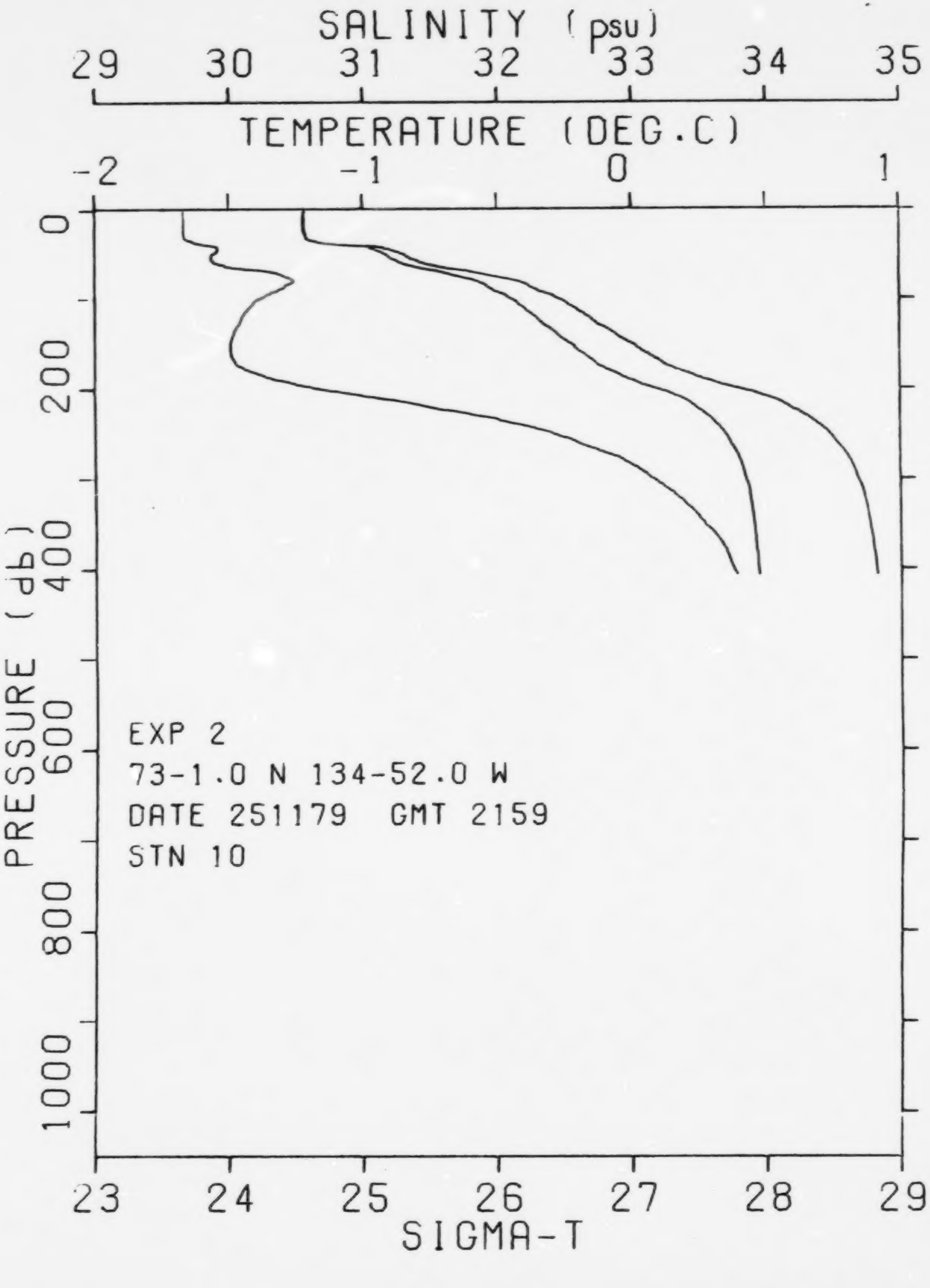
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 9 EXPERIMENT NO. 14 DATE 291179 GMT 834
LAT. 71-37.1 N LONG. 130-22.4 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.1	-1.703	31.316	25.184	.0059	1436.22
3.0	-1.704	31.318	25.186	.0083	1436.24
4.0	-1.703	31.316	25.185	.0111	1436.26
5.0	-1.702	31.316	25.184	.0139	1436.28
6.0	-1.702	31.317	25.185	.0166	1436.29
7.0	-1.702	31.317	25.185	.0194	1436.31
8.0	-1.701	31.315	25.184	.0222	1436.33
9.0	-1.702	31.316	25.184	.0249	1436.34
10.0	-1.702	31.317	25.185	.0277	1436.36
11.0	-1.701	31.315	25.184	.0305	1436.37
12.0	-1.701	31.316	25.184	.0333	1436.39
13.0	-1.702	31.316	25.184	.0360	1436.41
14.0	-1.701	31.315	25.183	.0388	1436.42
15.0	-1.702	31.316	25.184	.0416	1436.44
16.0	-1.702	31.317	25.185	.0443	1436.46
17.0	-1.702	31.317	25.185	.0471	1436.47
18.0	-1.702	31.317	25.185	.0499	1436.49
19.0	-1.702	31.317	25.185	.0527	1436.50
20.0	-1.703	31.318	25.186	.0554	1436.52
21.0	-1.701	31.316	25.184	.0582	1436.54
22.0	-1.701	31.316	25.185	.0610	1436.56
23.0	-1.702	31.317	25.185	.0637	1436.57
24.0	-1.701	31.317	25.185	.0665	1436.59
25.0	-1.703	31.320	25.187	.0693	1436.60
27.5	-1.703	31.323	25.190	.0762	1436.65
30.0	-1.704	31.325	25.192	.0831	1436.69
32.5	-1.703	31.332	25.197	.0900	1436.74
35.0	-1.705	31.342	25.205	.0969	1436.79
37.5	-1.704	31.362	25.222	.1037	1436.86
40.0	-1.693	31.585	25.402	.1105	1437.27
42.5	-1.728	31.755	25.541	.1167	1437.38
45.0	-1.745	31.915	25.672	.1226	1437.57
47.5	-1.742	31.975	25.720	.1283	1437.71
50.0	-1.744	32.068	25.796	.1339	1437.87
55.0	-1.592	32.352	26.024	.1443	1439.07
60.0	-1.733	32.556	26.193	.1537	1438.77
65.0	-1.725	32.782	26.376	.1623	1439.21
70.0	-1.679	33.003	26.554	.1701	1439.82
75.0	-1.675	33.063	26.603	.1773	1440.01
80.0	-1.679	33.136	26.663	.1843	1440.17
85.0	-1.693	33.184	26.702	.1910	1440.26
90.0	-1.653	33.235	26.742	.1975	1440.60
95.0	-1.651	33.273	26.773	.2038	1440.75

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.625	33.321	26.812	.2100	1441.02
105.0	-1.589	33.355	26.839	.2161	1441.32
110.0	-1.525	33.385	26.861	.2220	1441.74
115.0	-1.482	33.423	26.891	.2278	1442.09
120.0	-1.389	33.463	26.920	.2334	1442.66
125.0	-1.370	33.510	26.958	.2389	1442.90
130.0	-1.232	33.580	27.010	.2442	1443.72
135.0	-1.167	33.654	27.068	.2492	1444.22
140.0	-1.111	33.702	27.105	.2540	1444.63
145.0	-1.062	33.740	27.134	.2587	1444.99
150.0	-.952	33.856	27.225	.2630	1445.75
155.0	-.862	33.951	27.298	.2670	1446.39
160.0	-.745	34.054	27.377	.2707	1447.16
165.0	-.604	34.170	27.465	.2738	1448.05
170.0	-.412	34.321	27.578	.2766	1449.24
175.0	-.258	34.441	27.668	.2789	1450.20
180.0	-.192	34.494	27.708	.2808	1450.66
185.0	-.163	34.517	27.725	.2826	1450.90
190.0	-.155	34.535	27.739	.2844	1451.05
195.0	-.128	34.556	27.755	.2861	1451.28
200.0	-.111	34.569	27.764	.2877	1451.46
210.0	-.068	34.599	27.786	.2908	1451.86
220.0	-.009	34.638	27.815	.2937	1452.35
230.0	.065	34.682	27.846	.2964	1452.91
240.0	.096	34.707	27.865	.2987	1453.25
250.0	.152	34.738	27.887	.3009	1453.71
260.0	.188	34.755	27.898	.3029	1454.06
270.0	.214	34.766	27.906	.3049	1454.36
280.0	.239	34.778	27.914	.3067	1454.66
290.0	.251	34.790	27.923	.3085	1454.89
300.0	.273	34.798	27.928	.3102	1455.16
310.0	.303	34.811	27.937	.3119	1455.48
320.0	.320	34.818	27.942	.3135	1455.74
330.0	.326	34.822	27.944	.3150	1455.93
340.0	.340	34.828	27.949	.3166	1456.16
350.0	.334	34.829	27.949	.3181	1456.30
360.0	.335	34.831	27.951	.3196	1456.47
370.0	.336	34.833	27.953	.3211	1456.64
380.0	.341	34.833	27.952	.3226	1456.83
390.0	.348	34.834	27.953	.3240	1457.03
400.0	.351	34.837	27.955	.3255	1457.21
406.4	.350	34.840	27.957	.3264	1457.31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EXP 2
73-1.0 N 134-52.0 W
DATE 251179 GMT 2159
STN 10
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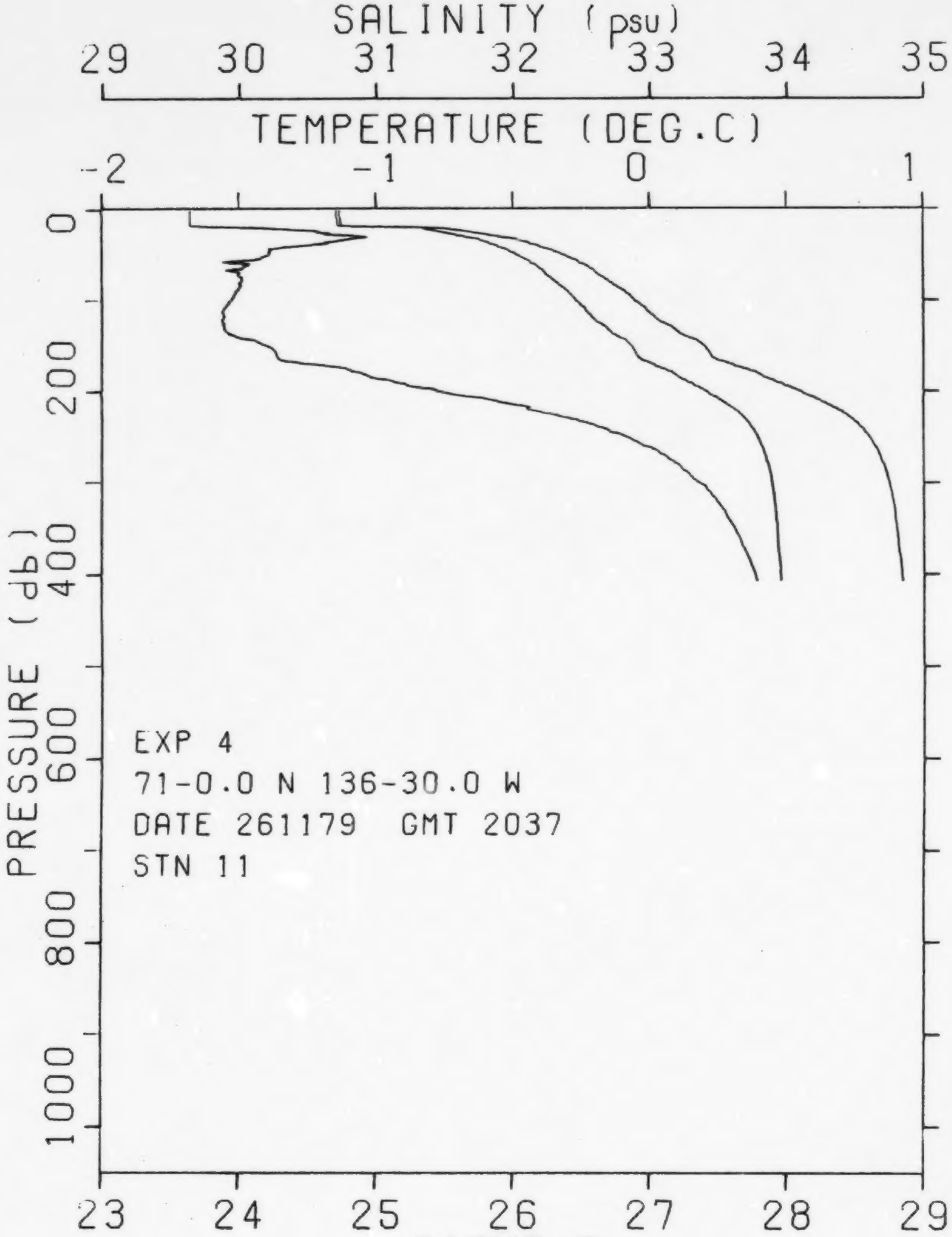
SIGMA-T

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION   10 EXPERIMENT NO.   2   DATE 251179 GMT 2159
LAT. 73-01.0 N   LONG. 134-52.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.3	-1.669	30.556	24.566	.0077	1435.32
3.0	-1.669	30.555	24.566	.0101	1435.33
4.0	-1.669	30.555	24.565	.0134	1435.35
5.0	-1.669	30.555	24.566	.0168	1435.37
6.0	-1.668	30.555	24.565	.0202	1435.38
7.0	-1.668	30.554	24.564	.0235	1435.40
8.0	-1.668	30.554	24.565	.0269	1435.42
9.0	-1.669	30.555	24.566	.0302	1435.43
10.0	-1.669	30.555	24.565	.0336	1435.45
11.0	-1.668	30.553	24.564	.0370	1435.47
12.0	-1.669	30.555	24.565	.0403	1435.48
13.0	-1.668	30.555	24.566	.0437	1435.50
14.0	-1.668	30.555	24.565	.0470	1435.51
15.0	-1.668	30.554	24.565	.0504	1435.53
16.0	-1.668	30.554	24.565	.0538	1435.55
17.0	-1.667	30.553	24.564	.0571	1435.57
18.0	-1.668	30.553	24.564	.0605	1435.58
19.0	-1.669	30.555	24.565	.0639	1435.60
20.0	-1.669	30.557	24.567	.0672	1435.61
21.0	-1.668	30.556	24.567	.0706	1435.63
22.0	-1.668	30.556	24.566	.0739	1435.65
23.0	-1.668	30.555	24.566	.0773	1435.67
24.0	-1.668	30.558	24.566	.0806	1435.68
25.0	-1.669	30.559	24.569	.0840	1435.70
27.5	-1.668	30.567	24.576	.0924	1435.75
30.0	-1.667	30.574	24.581	.1007	1435.81
32.5	-1.665	30.577	24.583	.1091	1435.87
35.0	-1.651	30.610	24.610	.1174	1436.02
37.5	-1.625	30.691	24.676	.1257	1436.30
40.0	-1.592	30.826	24.784	.1337	1436.68
42.5	-1.544	31.124	25.025	.1412	1437.37
45.0	-1.543	31.198	25.085	.1484	1437.52
47.5	-1.545	31.254	25.131	.1555	1437.63
50.0	-1.562	31.295	25.164	.1625	1437.65
55.0	-1.564	31.350	25.209	.1763	1437.80
60.0	-1.557	31.434	25.278	.1899	1438.03
65.0	-1.498	31.586	25.400	.2030	1438.60
70.0	-1.345	31.802	25.572	.2154	1439.72
75.0	-1.294	31.967	25.704	.2270	1440.27
80.0	-1.256	32.138	25.841	.2381	1440.77
85.0	-1.289	32.239	25.924	.2486	1440.84
90.0	-1.316	32.294	25.970	.2588	1440.87
95.0	-1.347	32.392	26.050	.2687	1440.94

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.379	32.450	26.098	.2783	1440.95
105.0	-1.409	32.524	26.159	.2876	1441.00
110.0	-1.423	32.574	26.200	.2968	1441.09
115.0	-1.437	32.623	26.240	.3057	1441.17
120.0	-1.449	32.676	26.283	.3143	1441.27
125.0	-1.455	32.718	26.318	.3228	1441.38
130.0	-1.463	32.766	26.357	.3312	1441.49
135.0	-1.475	32.833	26.411	.3393	1441.61
140.0	-1.483	32.885	26.454	.3471	1441.73
145.0	-1.488	32.933	26.493	.3548	1441.86
150.0	-1.494	33.000	26.547	.3623	1442.00
155.0	-1.493	33.048	26.586	.3695	1442.16
160.0	-1.493	33.096	26.626	.3766	1442.30
165.0	-1.489	33.156	26.674	.3834	1442.49
170.0	-1.477	33.222	26.727	.3900	1442.72
175.0	-1.465	33.265	26.762	.3964	1442.92
180.0	-1.428	33.357	26.835	.4025	1443.31
185.0	-1.377	33.458	26.915	.4083	1443.77
190.0	-1.330	33.539	26.980	.4138	1444.19
195.0	-1.255	33.653	27.070	.4188	1444.79
200.0	-1.180	33.777	27.169	.4234	1445.39
210.0	-.955	34.019	27.356	.4312	1446.95
220.0	-.761	34.173	27.474	.4376	1448.23
230.0	-.574	34.298	27.567	.4431	1449.44
240.0	-.417	34.393	27.637	.4478	1450.46
250.0	-.293	34.474	27.697	.4519	1451.31
260.0	-.201	34.530	27.737	.4555	1451.97
270.0	-.111	34.589	27.781	.4588	1452.63
280.0	-.026	34.633	27.811	.4617	1453.25
290.0	.035	34.665	27.834	.4643	1453.73
300.0	.077	34.688	27.851	.4668	1454.12
310.0	.128	34.721	27.874	.4691	1454.56
320.0	.169	34.738	27.885	.4713	1454.93
330.0	.207	34.753	27.896	.4733	1455.29
340.0	.243	34.766	27.904	.4753	1455.64
350.0	.270	34.775	27.910	.4772	1455.94
360.0	.307	34.788	27.918	.4790	1456.28
370.0	.331	34.795	27.923	.4808	1456.57
380.0	.353	34.803	27.927	.4825	1456.84
390.0	.362	34.813	27.935	.4842	1457.06
400.0	.376	34.820	27.940	.4856	1457.29
407.9	.389	34.827	27.945	.4870	1457.49


SALINITY (psu)
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35
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-1
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PRESSURE (db)
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200
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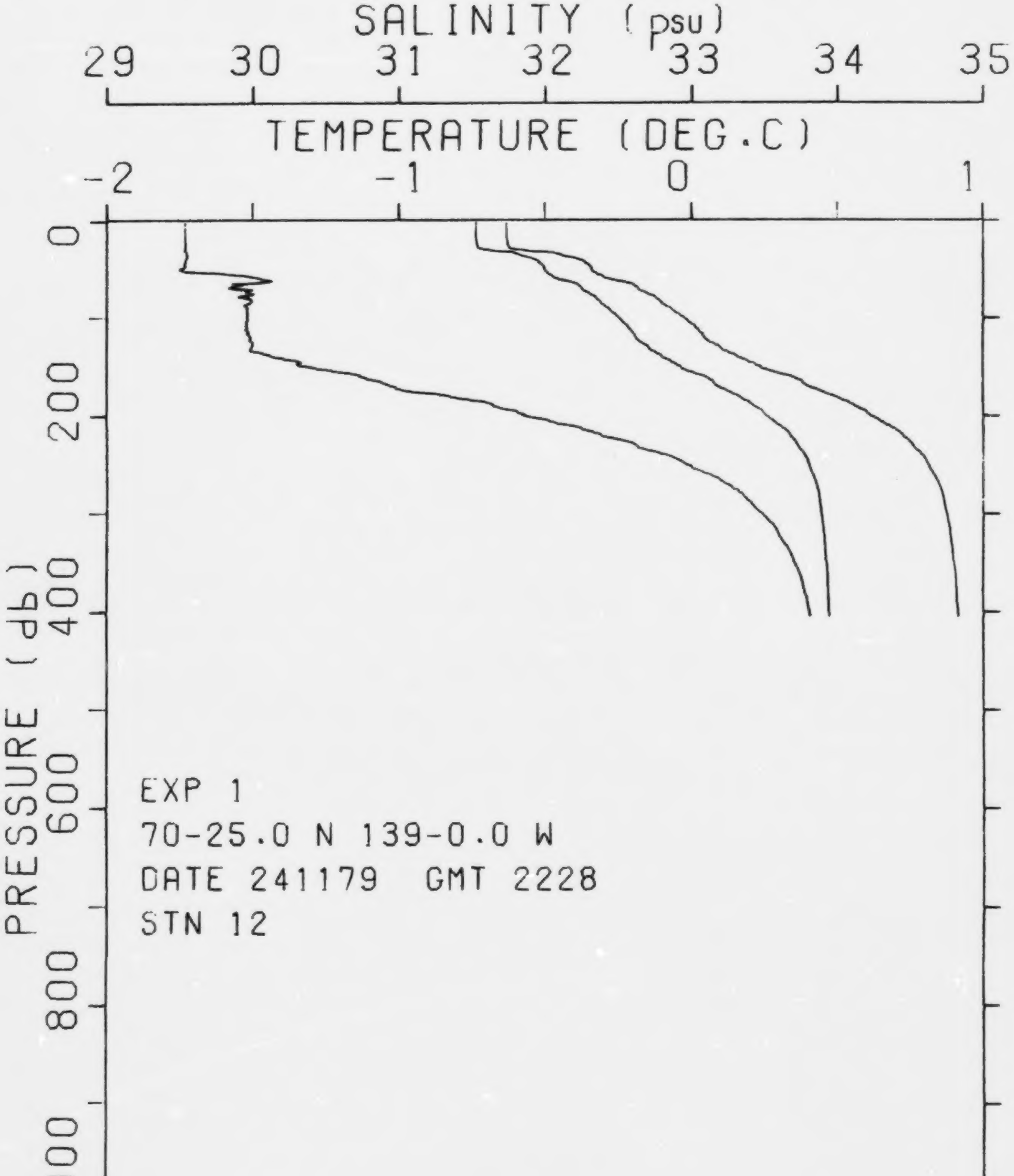
600
800
1000
23
24
25
26
27
28
29
SIGMA-T
EXP 4
71-0.0 N 136-30.0 W
DATE 261179 GMT 2037
STN 11

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 11 EXPERIMENT NO. 4 DATE 261179 GMT 2037
LAT. 71-00.0 N LONG. 136-30.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.4	-1.681	30.726	24.705	.0078	1435.51
3.0	-1.680	30.727	24.705	.0097	1435.52
4.0	-1.680	30.726	24.705	.0129	1435.54
5.0	-1.680	30.725	24.704	.0161	1435.55
6.0	-1.680	30.726	24.705	.0194	1435.55
7.0	-1.680	30.727	24.705	.0226	1435.57
8.0	-1.681	30.727	24.705	.0226	1435.59
9.0	-1.679	30.728	24.706	.0258	1435.60
10.0	-1.681	30.731	24.706	.0291	1435.62
11.0	-1.679	30.733	24.709	.0323	1435.64
12.0	-1.679	30.733	24.710	.0355	1435.66
13.0	-1.681	30.736	24.710	.0387	1435.68
14.0	-1.680	30.739	24.713	.0419	1435.69
15.0	-1.681	30.741	24.715	.0452	1435.72
16.0	-1.681	30.740	24.716	.0484	1435.73
17.0	-1.680	30.742	24.716	.0516	1435.75
18.0	-1.681	30.742	24.717	.0548	1435.77
19.0	-1.680	30.744	24.718	.0580	1435.78
20.0	-1.510	31.194	24.719	.0612	1435.81
21.0	-1.428	31.434	25.081	.0643	1437.26
22.0	-1.343	31.529	25.274	.0671	1438.00
23.0	-1.291	31.575	25.350	.0697	1438.56
24.0	-1.227	31.628	25.386	.0723	1438.88
25.0	-1.208	31.669	25.427	.0749	1439.27
27.5	-1.065	31.765	25.460	.0774	1439.44
30.0	-1.075	31.885	25.534	.0836	1440.29
32.5	-1.062	31.991	25.631	.0895	1440.45
35.0	-1.136	32.052	25.717	.0953	1440.70
37.5	-1.191	32.118	25.768	.1009	1440.48
40.0	-1.246	32.179	25.824	.1063	1440.35
42.5	-1.344	32.212	25.874	.1117	1440.22
45.0	-1.379	32.279	25.904	.1169	1439.85
47.5	-1.391	32.316	25.959	.1221	1439.81
50.0	-1.389	32.358	25.989	.1271	1439.85
55.0	-1.422	32.433	26.023	.1321	1439.96
60.0	-1.457	32.495	26.085	.1418	1439.99
65.0	-1.489	32.562	26.136	.1512	1439.99
70.0	-1.496	32.607	26.192	.1604	1440.02
75.0	-1.496	32.659	26.229	.1693	1440.13
80.0	-1.488	32.704	26.270	.1781	1440.28
85.0	-1.492	32.757	26.307	.1867	1440.47
90.0	-1.512	32.813	26.350	.1950	1440.61
95.0	-1.519	32.856	26.396	.2032	1440.67
			26.431	.2112	1440.78

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.528	32.866	26.455	.2191	1440.86
105.0	-1.538	32.934	26.495	.2267	1440.96
110.0	-1.556	32.960	26.532	.2343	1441.03
115.0	-1.560	33.005	26.553	.2416	1441.13
120.0	-1.554	33.046	26.586	.2489	1441.29
125.0	-1.559	33.098	26.629	.2559	1441.43
130.0	-1.552	33.170	26.687	.2627	1441.64
135.0	-1.544	33.211	26.720	.2693	1441.82
140.0	-1.507	33.274	26.770	.2758	1442.17
145.0	-1.433	33.357	26.836	.2819	1442.71
150.0	-1.402	33.396	26.866	.2878	1442.99
155.0	-1.371	33.423	26.887	.2936	1443.26
160.0	-1.362	33.448	26.907	.2993	1443.42
165.0	-1.355	33.484	26.936	.3048	1443.59
170.0	-1.259	33.584	27.015	.3102	1444.26
175.0	-1.105	33.684	27.091	.3151	1445.21
180.0	-1.056	33.788	27.173	.3197	1445.66
185.0	-1.018	33.841	27.214	.3239	1445.99
190.0	-.934	33.920	27.276	.3280	1446.58
195.0	-.873	34.000	27.338	.3317	1447.06
200.0	-.779	34.093	27.410	.3351	1447.71
210.0	-.580	34.238	27.519	.3411	1449.00
220.0	-.451	34.374	27.623	.3461	1449.95
230.0	-.290	34.476	27.698	.3503	1450.99
240.0	-.175	34.547	27.749	.3539	1451.79
250.0	-.084	34.606	27.793	.3570	1452.45
260.0	-.022	34.643	27.819	.3598	1452.95
270.0	.052	34.680	27.845	.3624	1453.50
280.0	.103	34.712	27.868	.3648	1453.95
290.0	.144	34.736	27.885	.3669	1454.33
300.0	.179	34.751	27.895	.3690	1454.67
310.0	.220	34.765	27.905	.3709	1455.04
320.0	.247	34.779	27.914	.3728	1455.35
330.0	.271	34.789	27.921	.3746	1455.63
340.0	.289	34.796	27.926	.3763	1455.89
350.0	.312	34.804	27.931	.3780	1456.17
360.0	.328	34.811	27.935	.3797	1456.41
370.0	.339	34.815	27.938	.3813	1456.63
380.0	.356	34.828	27.948	.3829	1456.89
390.0	.371	34.834	27.951	.3844	1457.13
400.0	.384	34.838	27.954	.3859	1457.36
407.1	.392	34.842	27.957	.3869	1457.52

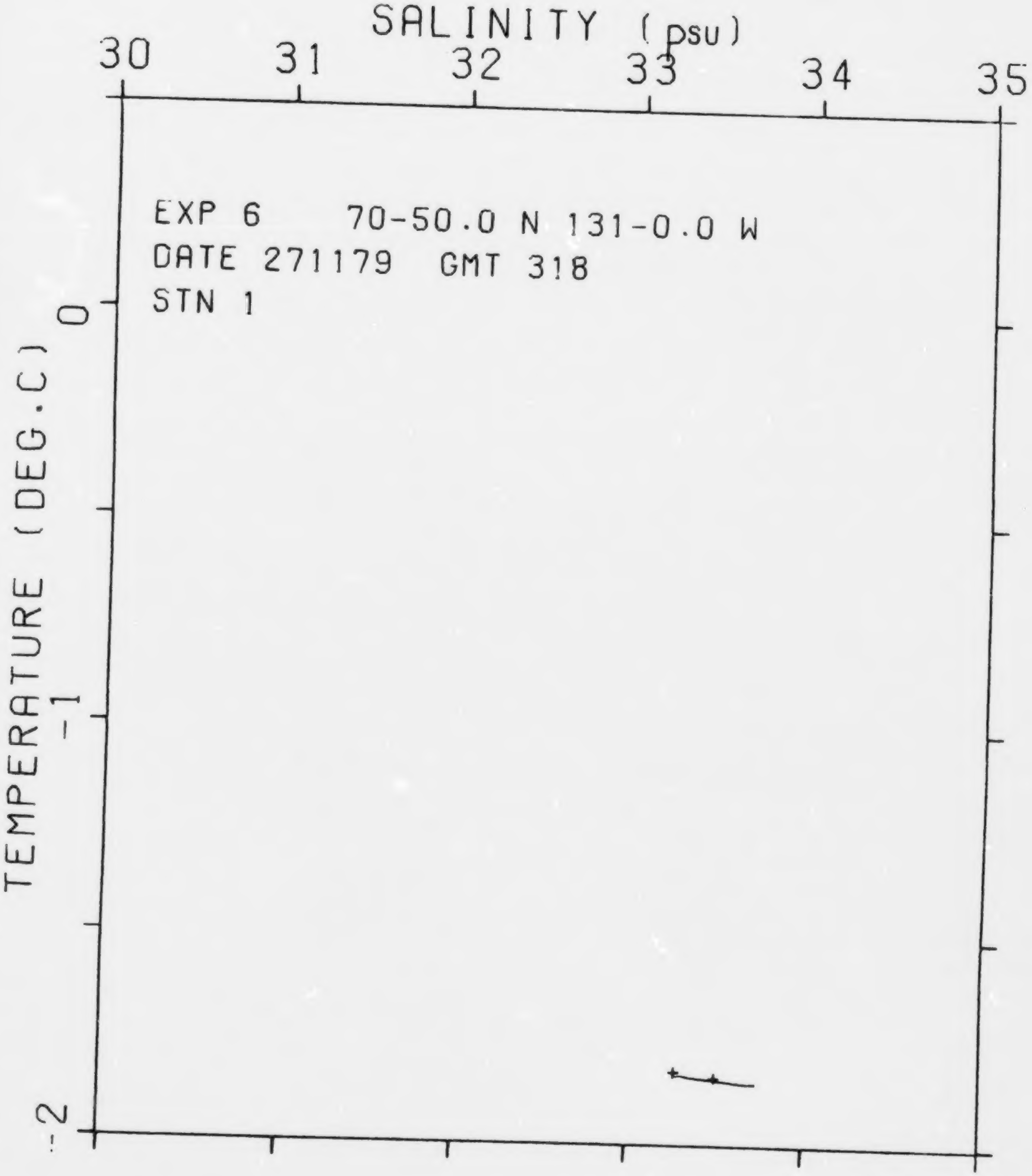


EXP 1
70-25.0 N 139-0.0 W
DATE 241179 GMT 2228
STN 12

CRUISE 015-79-021 SOUTHERN BEAUFORT SEA
STATION 12 EXPERIMENT NO. 1 DATE 241179 GMT 2228
LAT. 70-25.0 N LONG. 139-00.0 W

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
2.8	-1.732	31.740	25.530	.0068	1436.69
3.0	-1.732	31.741	25.530	.0073	1436.70
4.0	-1.732	31.740	25.529	.0098	1436.71
5.0	-1.732	31.740	25.529	.0122	1436.73
6.0	-1.733	31.741	25.530	.0147	1436.74
7.0	-1.733	31.740	25.530	.0171	1436.76
8.0	-1.732	31.742	25.531	.0195	1436.78
9.0	-1.732	31.741	25.530	.0220	1436.79
10.0	-1.732	31.740	25.530	.0244	1436.81
11.0	-1.732	31.741	25.530	.0269	1436.83
12.0	-1.733	31.741	25.530	.0293	1436.84
13.0	-1.732	31.742	25.531	.0318	1436.86
14.0	-1.732	31.741	25.530	.0342	1436.88
15.0	-1.732	31.741	25.530	.0366	1436.89
16.0	-1.732	31.741	25.530	.0391	1436.91
17.0	-1.732	31.741	25.530	.0415	1436.92
18.0	-1.732	31.742	25.531	.0440	1436.94
19.0	-1.733	31.743	25.531	.0464	1436.96
20.0	-1.731	31.743	25.532	.0488	1436.98
21.0	-1.730	31.748	25.536	.0513	1437.01
22.0	-1.730	31.746	25.534	.0537	1437.02
23.0	-1.731	31.748	25.536	.0562	1437.04
24.0	-1.731	31.749	25.536	.0586	1437.06
25.0	-1.730	31.749	25.537	.0610	1437.08
27.5	-1.731	31.757	25.543	.0671	1437.12
30.0	-1.731	31.788	25.569	.0732	1437.21
32.5	-1.734	31.981	25.725	.0790	1437.51
35.0	-1.725	32.098	25.820	.0845	1437.76
37.5	-1.724	32.147	25.860	.0898	1437.87
40.0	-1.729	32.233	25.929	.0951	1438.01
42.5	-1.734	32.273	25.962	.1002	1438.08
45.0	-1.733	32.290	25.976	.1052	1438.15
47.5	-1.731	32.310	25.993	.1102	1438.23
50.0	-1.753	32.323	26.004	.1152	1438.19
55.0	-1.598	32.355	26.026	.1251	1439.05
60.0	-1.475	32.419	26.075	.1349	1439.80
65.0	-1.517	32.582	26.208	.1441	1439.91
70.0	-1.586	32.636	26.254	.1530	1439.75
75.0	-1.526	32.697	26.302	.1616	1440.20
80.0	-1.521	32.760	26.353	.1700	1440.39
85.0	-1.506	32.798	26.384	.1782	1440.60
90.0	-1.520	32.852	26.428	.1863	1440.69
95.0	-1.521	32.894	26.462	.1941	1440.83

PRESSURE (DBARS)	TEMP (DEG.C)	SALINITY	SIGMAT	DHA (DYN M)	SOUND (M/S)
100.0	-1.522	32.949	26.507	.2017	1440.98
105.0	-1.519	32.985	26.536	.2092	1441.13
110.0	-1.524	33.031	26.573	.2165	1441.25
115.0	-1.513	33.060	26.596	.2237	1441.43
120.0	-1.507	33.089	26.620	.2307	1441.57
125.0	-1.504	33.130	26.653	.2377	1441.73
130.0	-1.502	33.196	26.707	.2444	1441.91
135.0	-1.486	33.244	26.745	.2509	1442.14
140.0	-1.432	33.318	26.804	.2571	1442.58
145.0	-1.342	33.393	26.862	.2631	1443.19
150.0	-1.317	33.472	26.925	.2688	1443.50
155.0	-1.224	33.543	26.980	.2743	1444.12
160.0	-1.136	33.683	27.091	.2793	1444.81
165.0	-1.069	33.759	27.150	.2839	1445.32
170.0	-1.025	33.792	27.175	.2883	1445.65
175.0	-.980	33.884	27.248	.2925	1446.07
180.0	-.826	33.977	27.317	.2964	1447.00
185.0	-.736	34.048	27.372	.3000	1447.60
190.0	-.676	34.116	27.424	.3033	1448.05
195.0	-.603	34.195	27.485	.3064	1448.59
200.0	-.580	34.227	27.510	.3092	1448.82
210.0	-.418	34.345	27.598	.3144	1449.90
220.0	-.307	34.451	27.679	.3187	1450.72
230.0	-.189	34.522	27.730	.3225	1451.53
240.0	-.091	34.584	27.775	.3258	1452.22
250.0	-.020	34.625	27.805	.3287	1452.77
260.0	.057	34.665	27.832	.3315	1453.34
270.0	.117	34.698	27.856	.3339	1453.82
280.0	.174	34.726	27.875	.3362	1454.29
290.0	.209	34.738	27.883	.3383	1454.63
300.0	.242	34.754	27.894	.3404	1454.96
310.0	.275	34.768	27.904	.3423	1455.29
320.0	.297	34.779	27.911	.3442	1455.57
330.0	.316	34.787	27.917	.3461	1455.83
340.0	.340	34.794	27.921	.3478	1456.12
350.0	.353	34.807	27.931	.3496	1456.36
360.0	.368	34.814	27.935	.3513	1456.60
370.0	.381	34.818	27.938	.3529	1456.83
380.0	.388	34.823	27.942	.3545	1457.03
390.0	.398	34.826	27.943	.3561	1457.24
400.0	.405	34.829	27.946	.3576	1457.44
405.9	.409	34.833	27.948	.3585	1457.56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EXP 6 70-50.0 N 131-0.0 W
DATE 271179 GMT 318
STN 1
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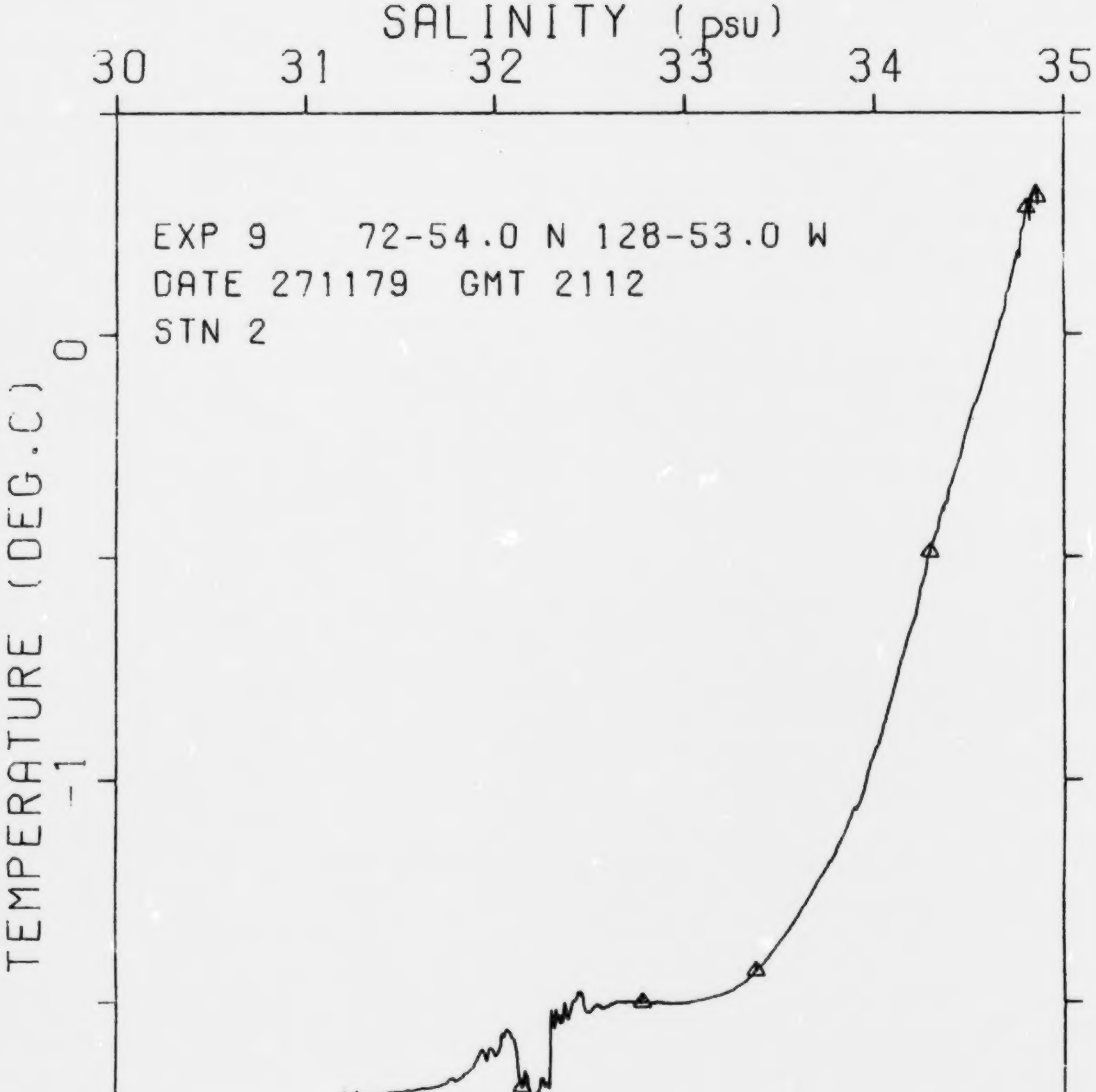
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TEMPERATURE (DEG.C)
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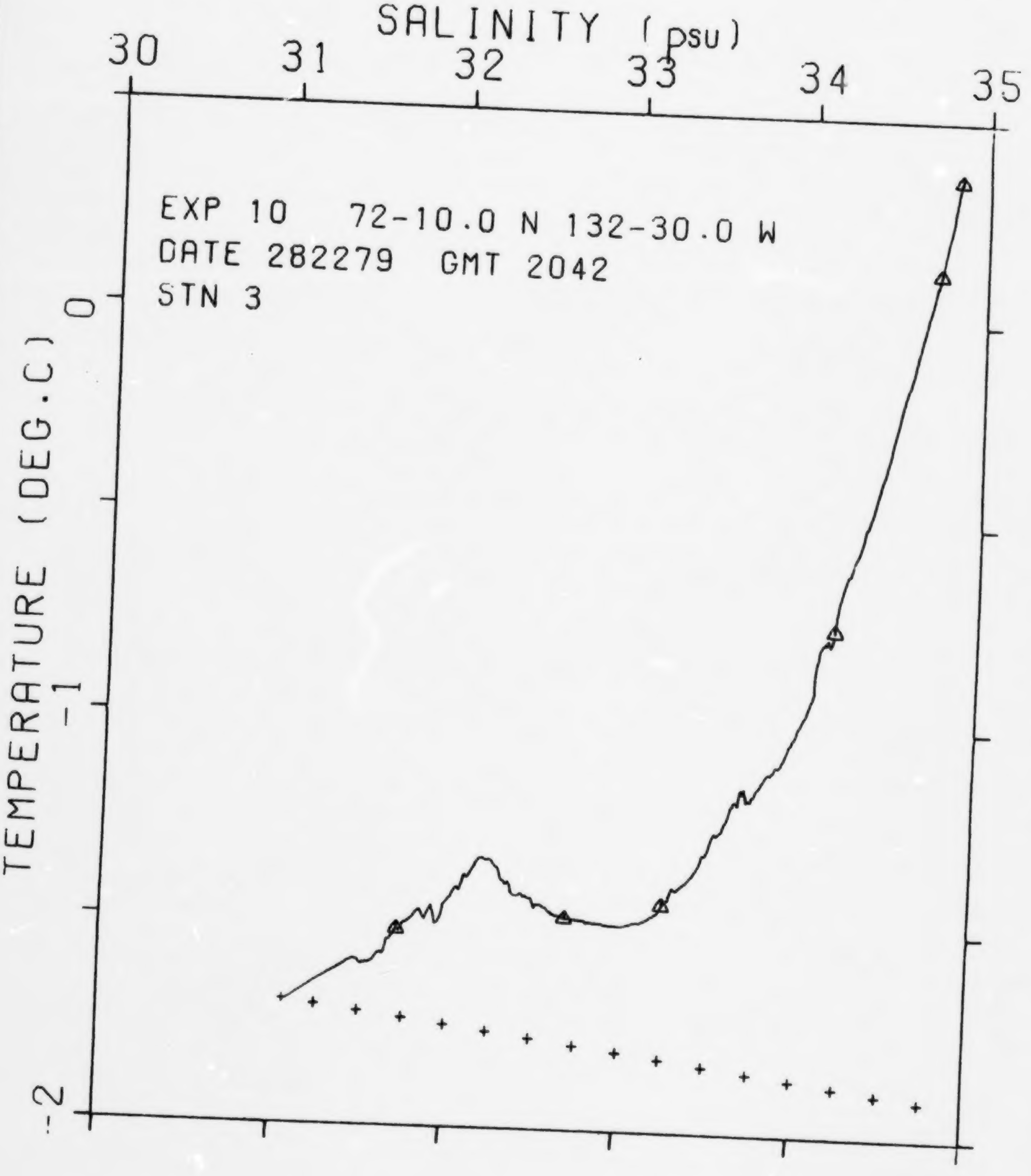
EXP 9 72-54.0 N 128-53.0 W
DATE 271179 GMT 2112
STN 2


SALINITY (psu)
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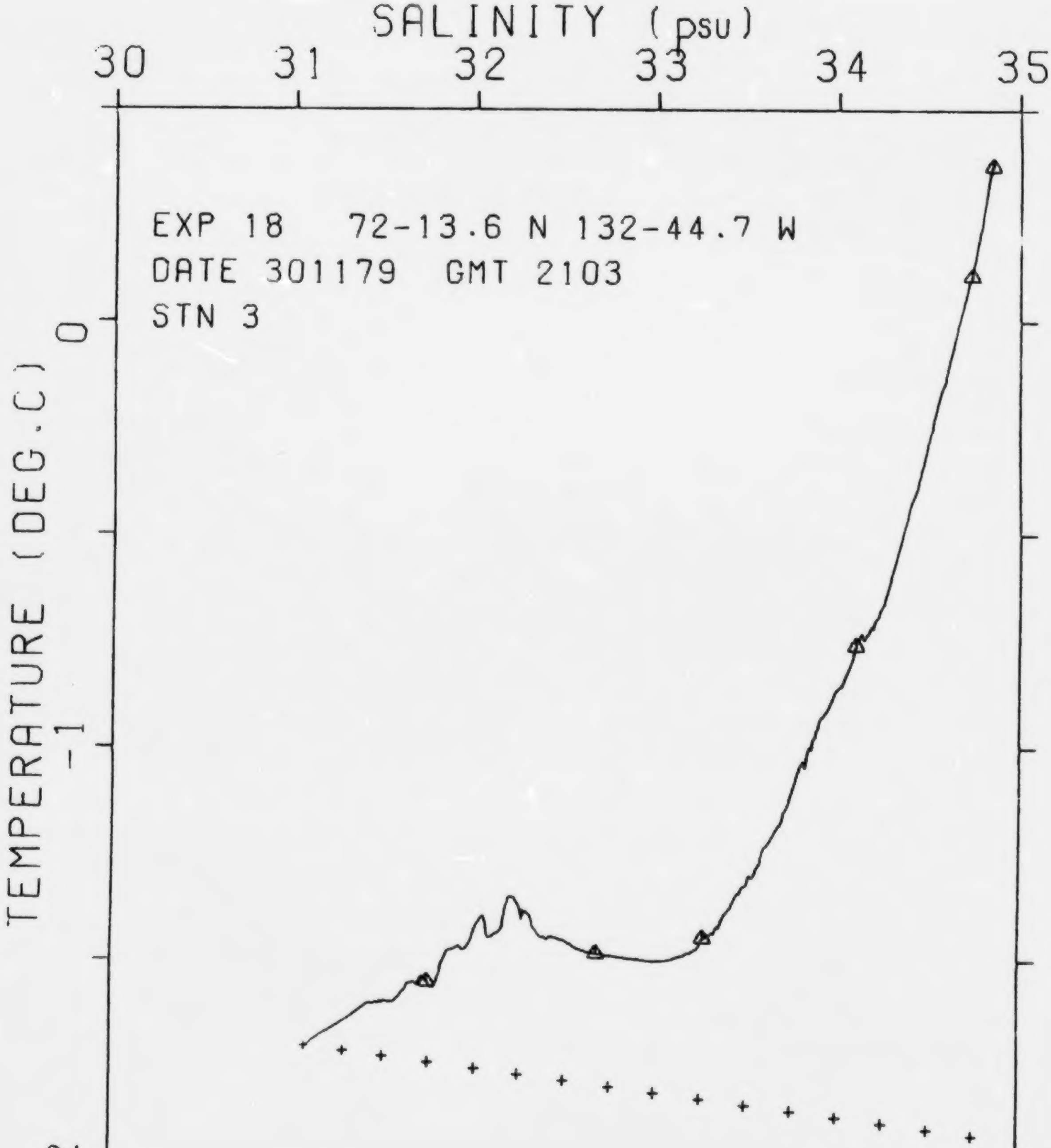
EXP 10 72-10.0 N 132-30.0 W
DATE 282279 GMT 2042
STN 3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TEMPERATURE (DEG.C)
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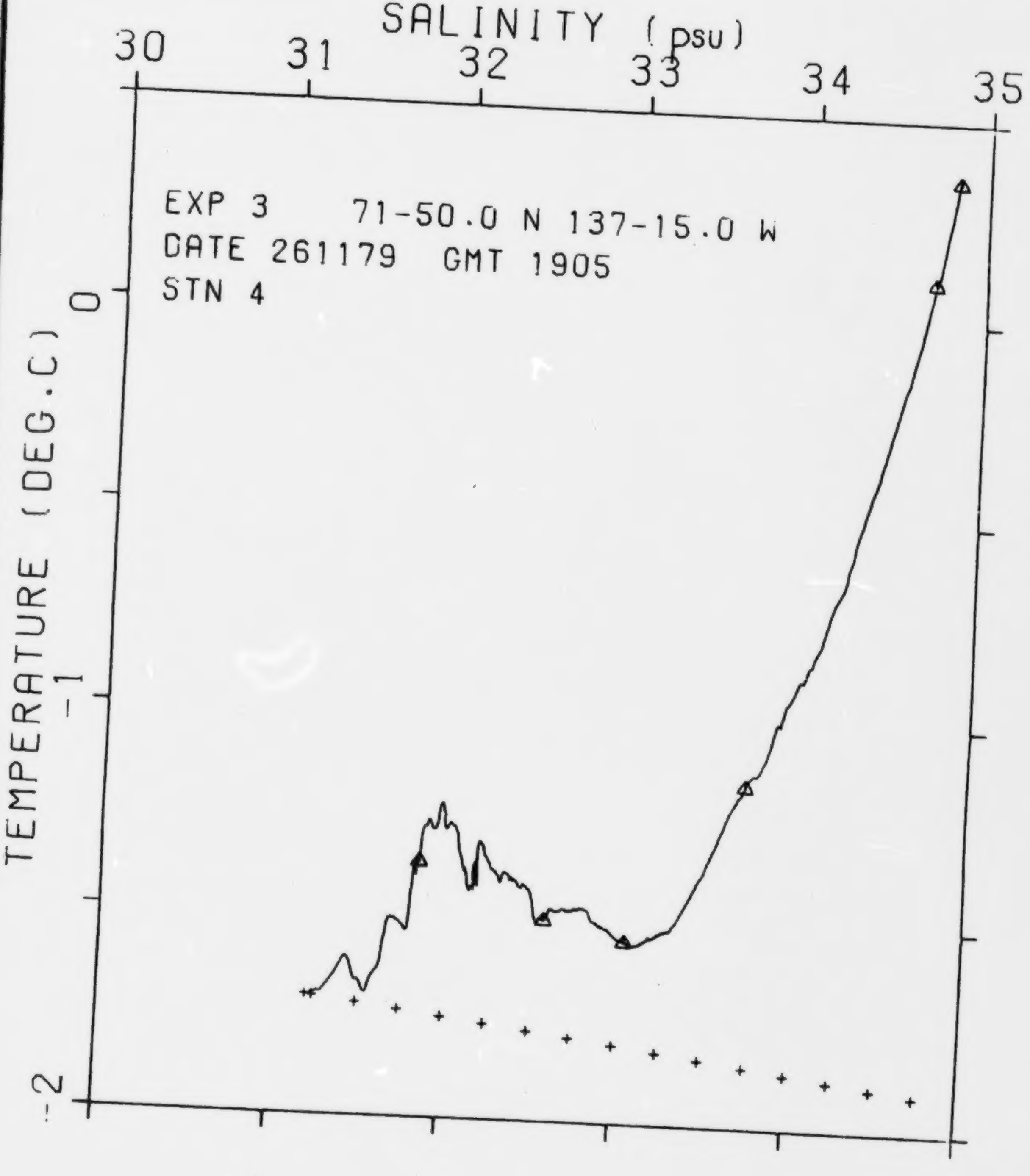
EXP 18 72-13.6 N 132-44.7 W
DATE 301179 GMT 2103
STN 3


SALINITY (psu)
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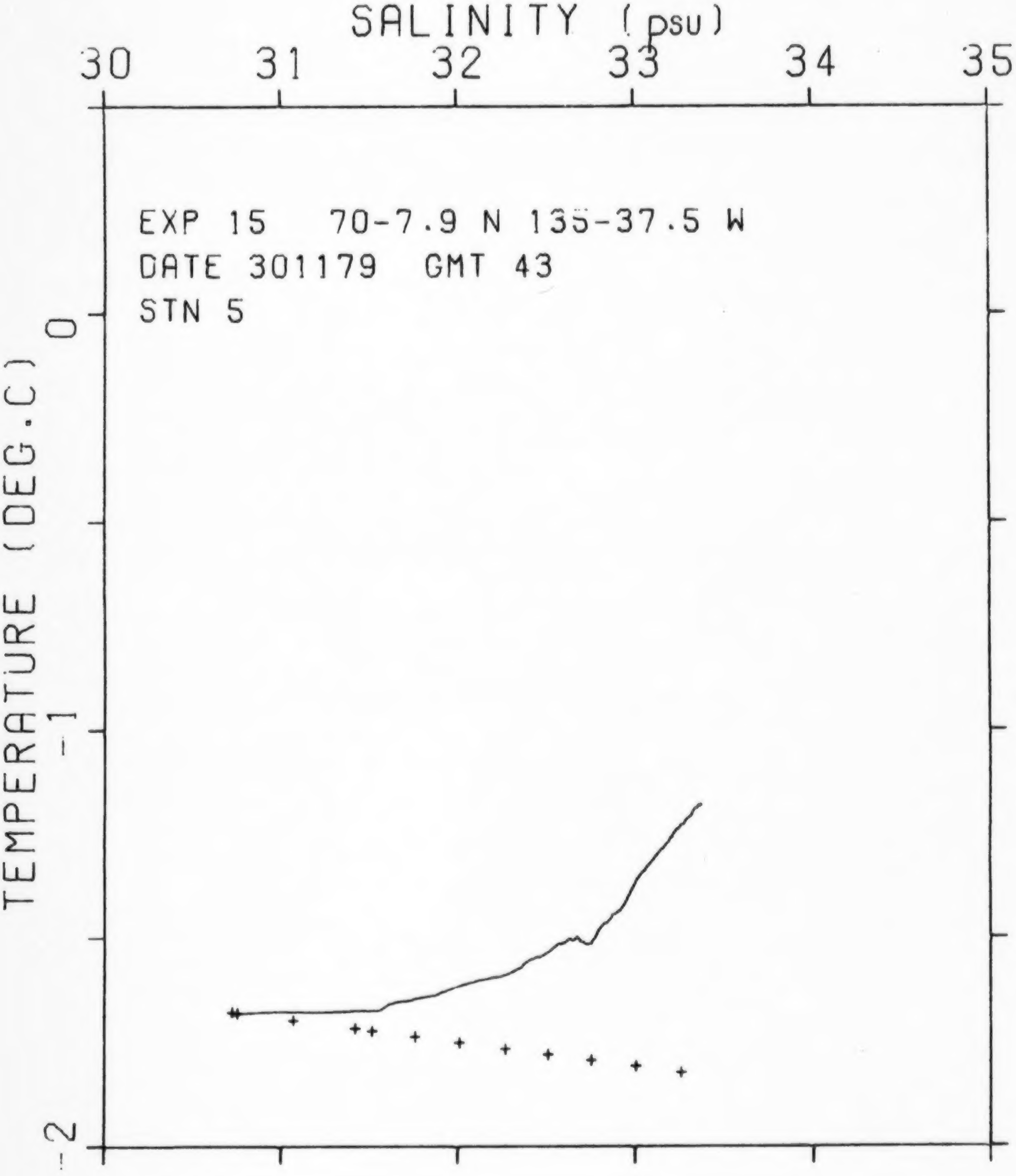
DATE 261179 GMT 1905
STN 4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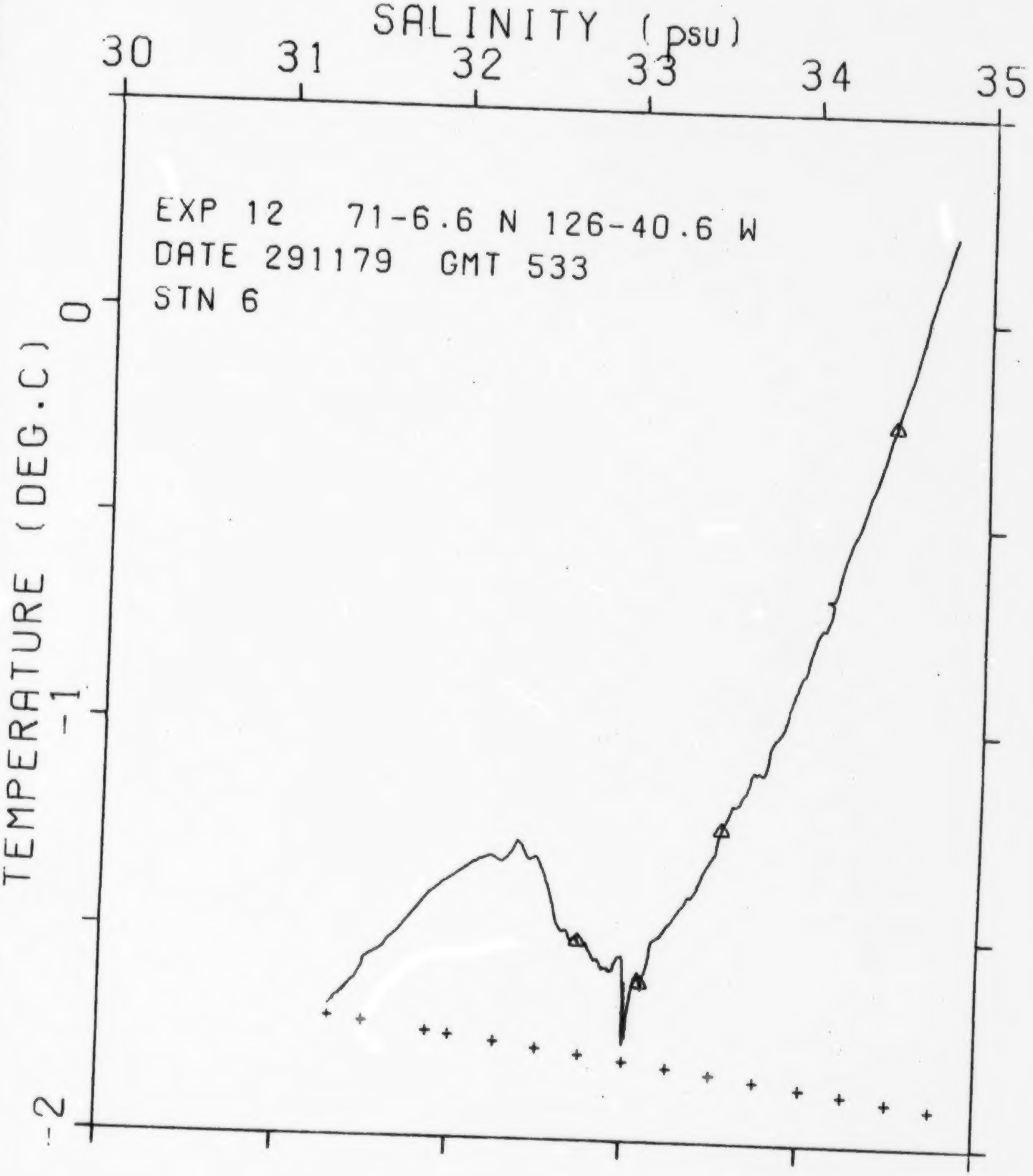
DATE 301179 GMT 43
STN 5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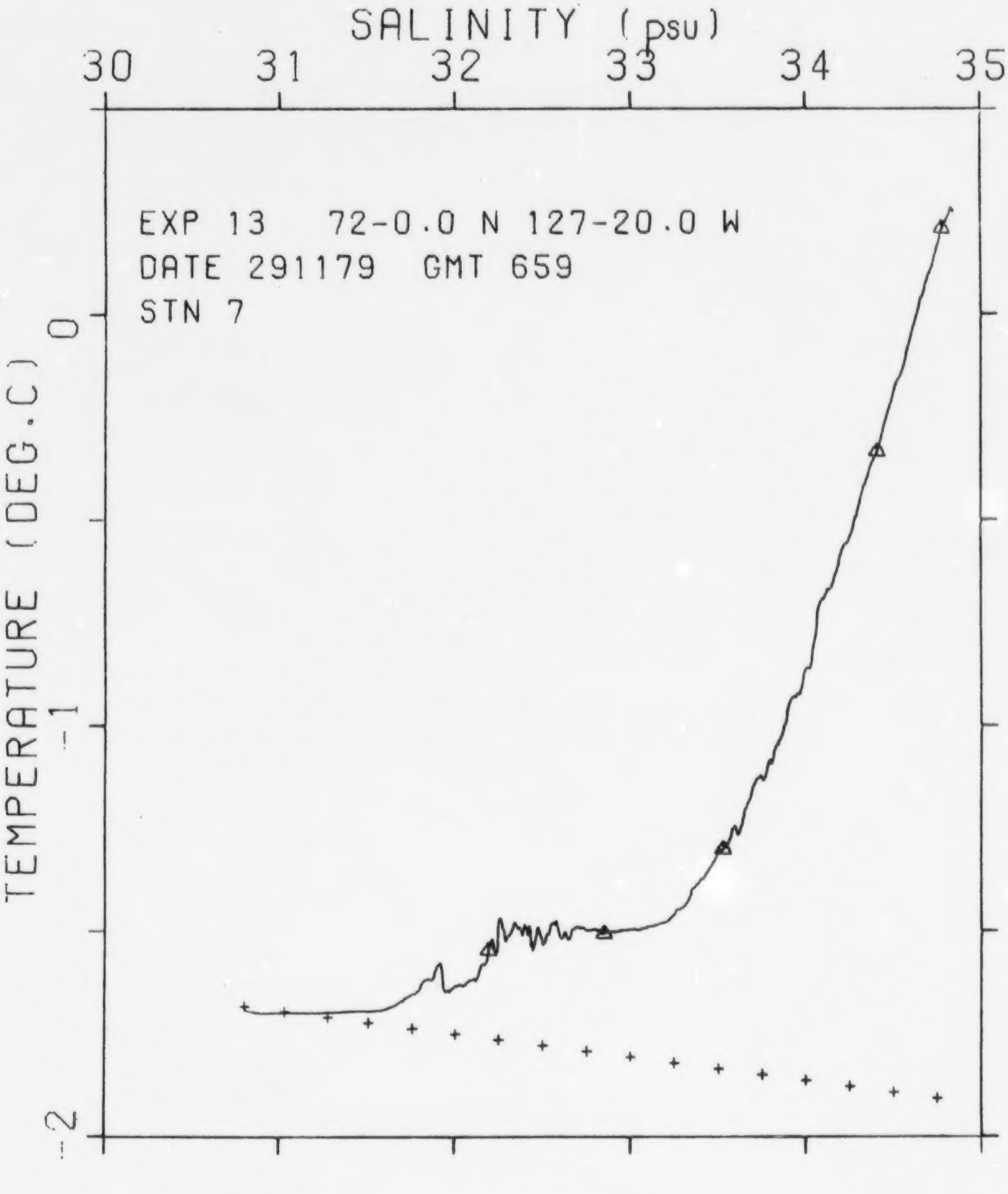
DATE 291179 GMT 533
STN 6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TEMPERATURE (DEG.C)
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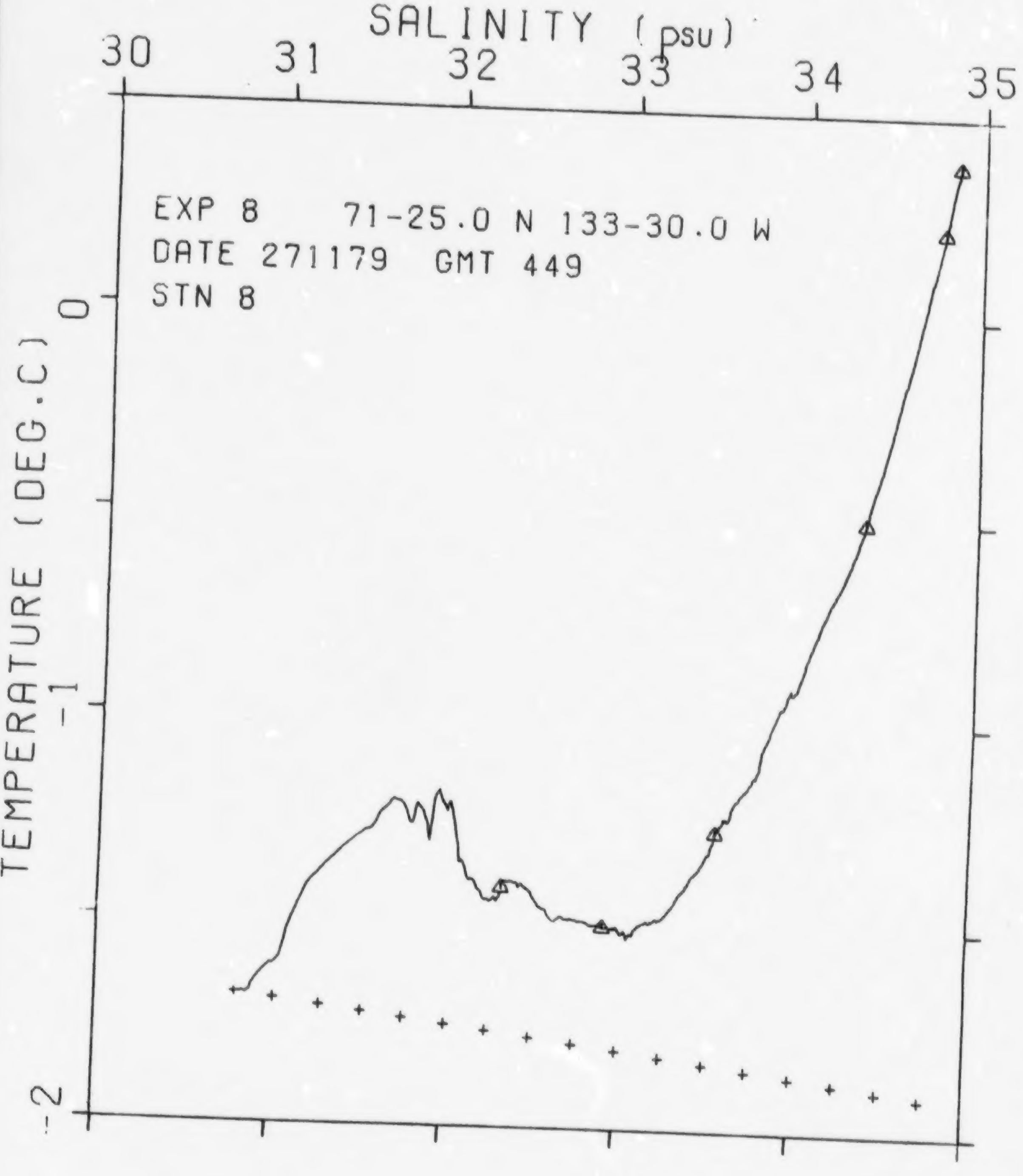
-1
-2
EXP 13 72-0.0 N 127-20.0 W
DATE 291179 GMT 659
STN 7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30
31
32
33
34
35
TEMPERATURE (DEG.C)
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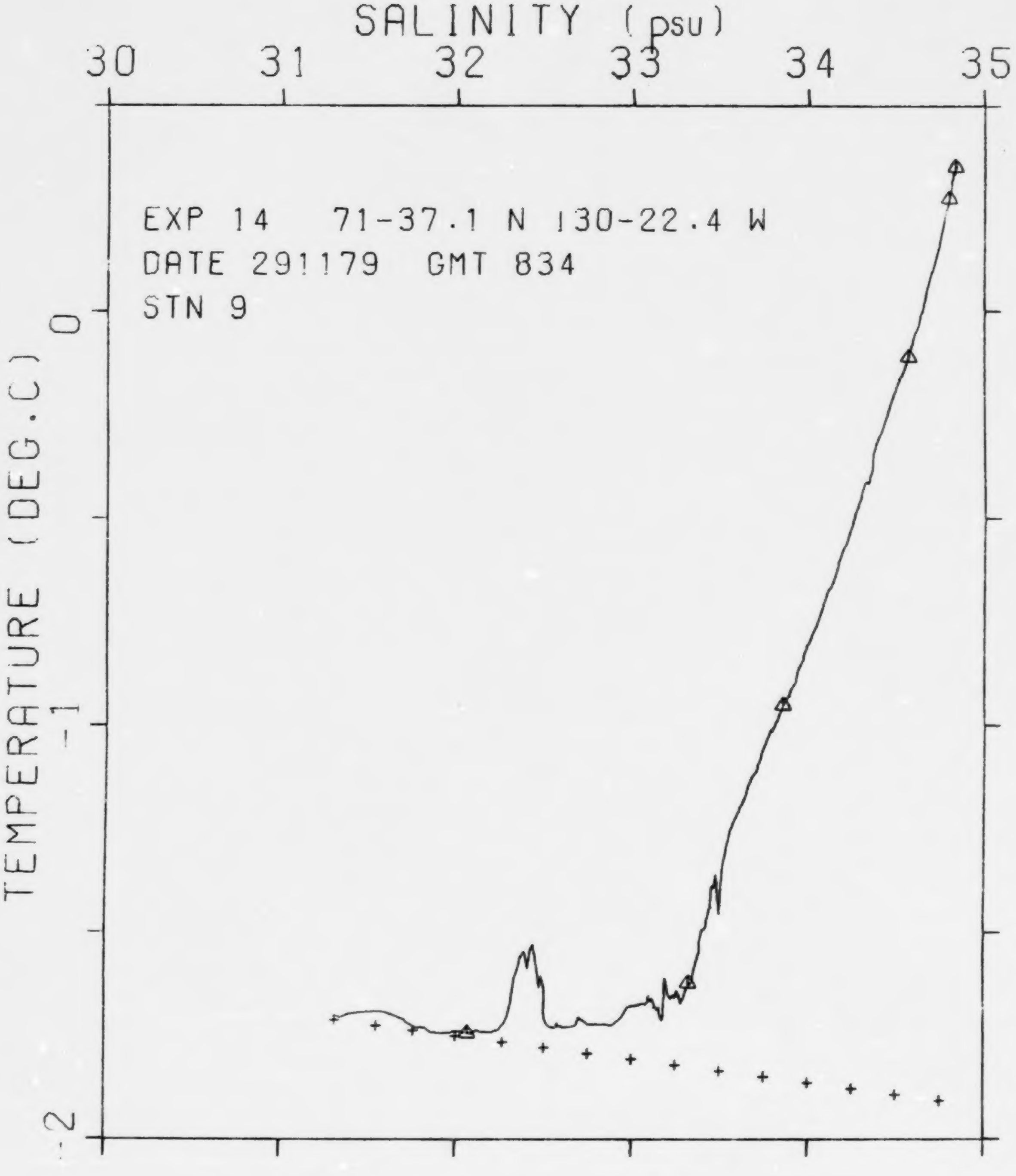
-1
-2
EXP 8 71-25.0 N 133-30.0 W
DATE 271179 GMT 449
STN 8


SALINITY (psu)
30
31
32
33
34
35
TEMPERATURE (DEG.C)
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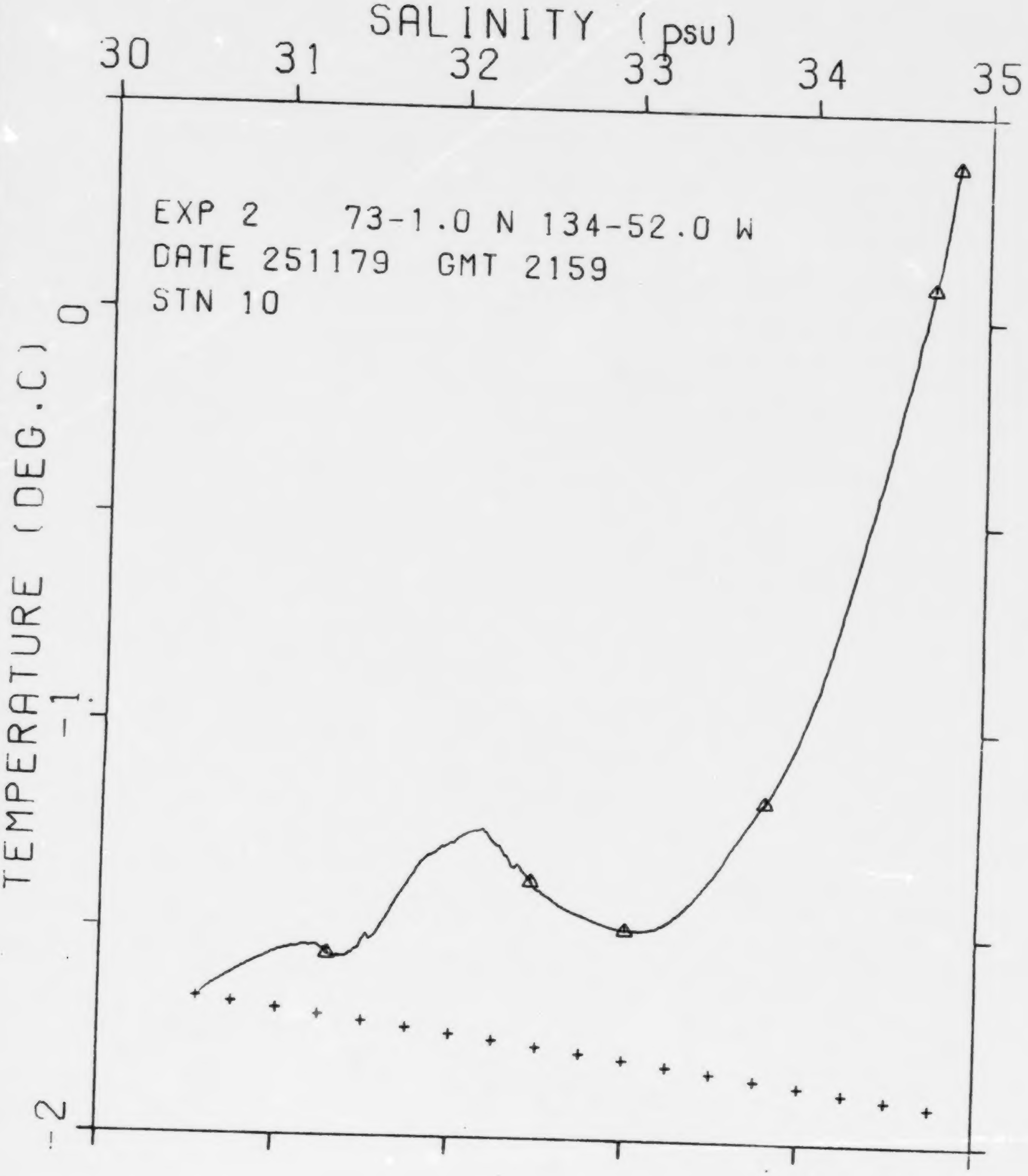
-1
-2
EXP 14 71-37.1 N 130-22.4 W
DATE 291179 GMT 834
STN 9


SALINITY (psu)
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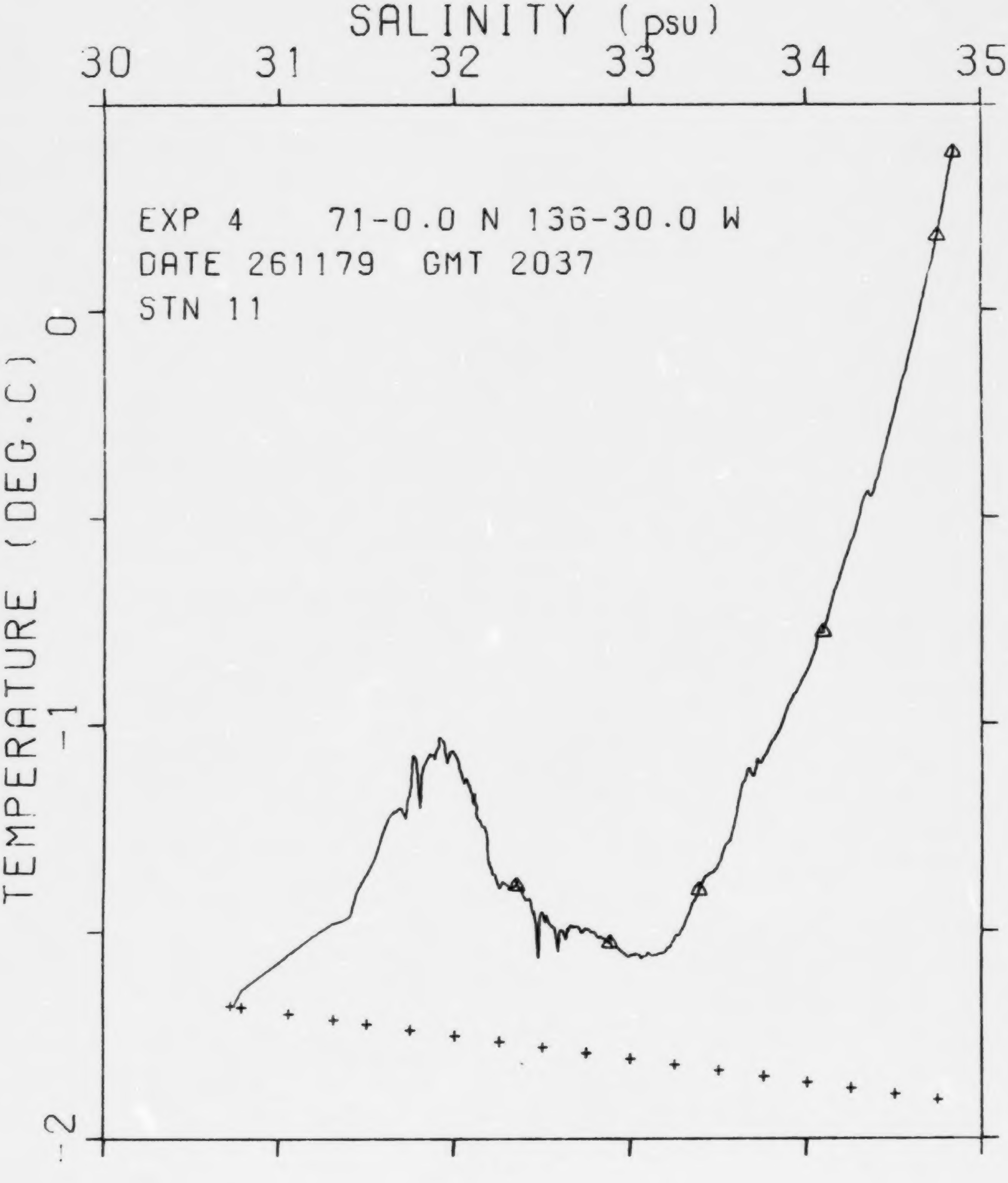
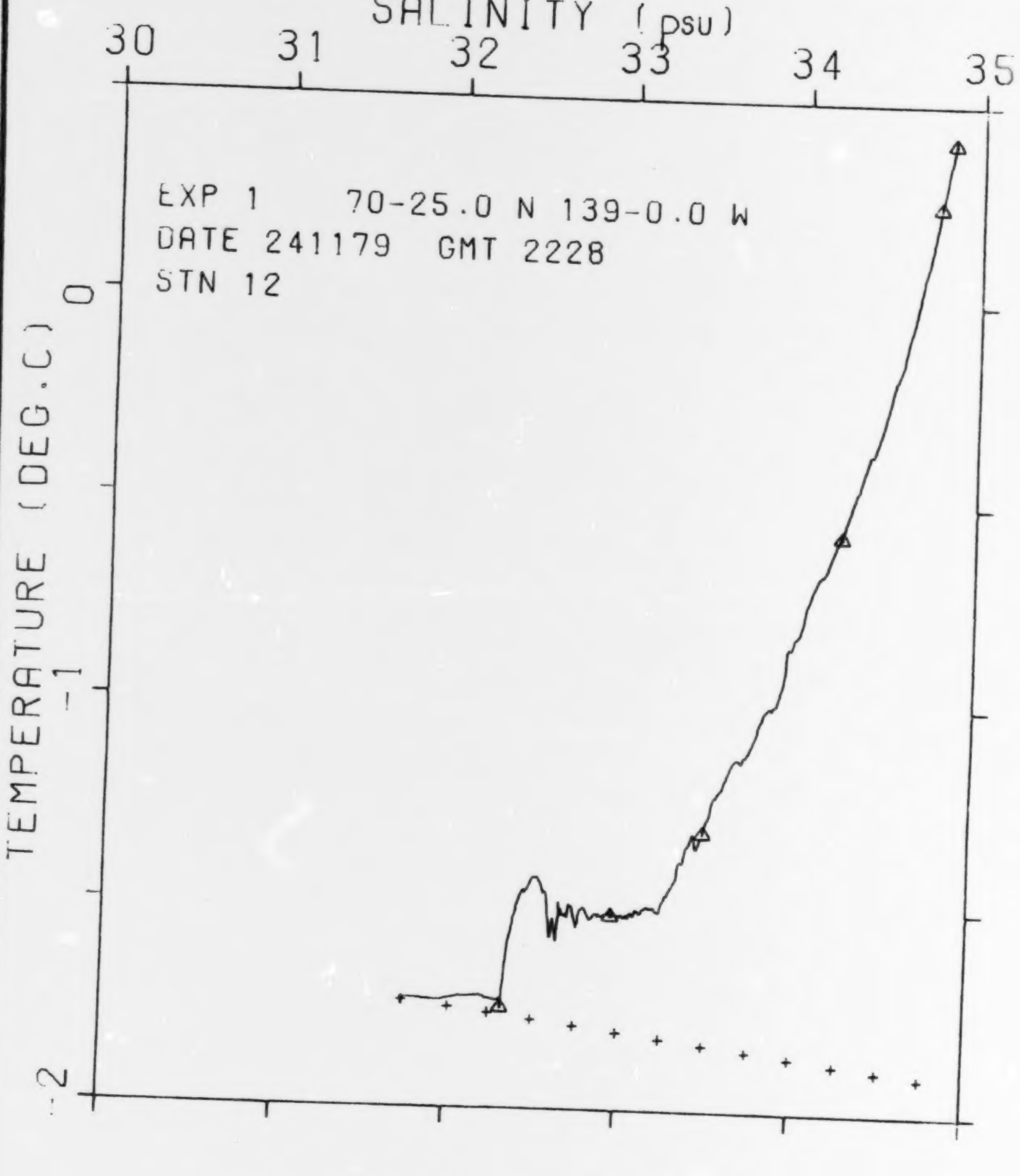
31
32
33
34
35
TEMPERATURE (DEG.C)
0
-1
-2
EXP 2 73-1.0 N 134-52.0 W
DATE 251179 GMT 2159
STN 10


SALINITY (psu)
30
31
32
33
34
35
TEMPERATURE (DEG.C)
0
-1
-2
EXP 4 71-0.0 N 136-30.0 W
DATE 261179 GMT 2037
STN 11


SALINITY (psu)
30
31
32
33
34
35
TEMPERATURE (DEG.C)
0
-1
-2
EXP 1 70-25.0 N 139-0.0 W
DATE 241179 GMT 2228
STN 12

Appendix 2

Current Measurements

Figure A2-1 displays time sequences of measured ice velocity, u (top), and relative water current at 18m, v (centre). The bottom sequence is the absolute current at 18m, w, computed using the vector identy, u=w-v. Note that the ice velocity is a Lagrangian quantity, while the absolute current is neither Eulerian nor Lagrangian because the observation platform moves about, but not with the fluid at 18m.

Figure A2-2 is a progressive vector plot of the absolute current at 18 m. It is not directly comparable to normal progressive vectors because the measured velocity is not Eulerian.

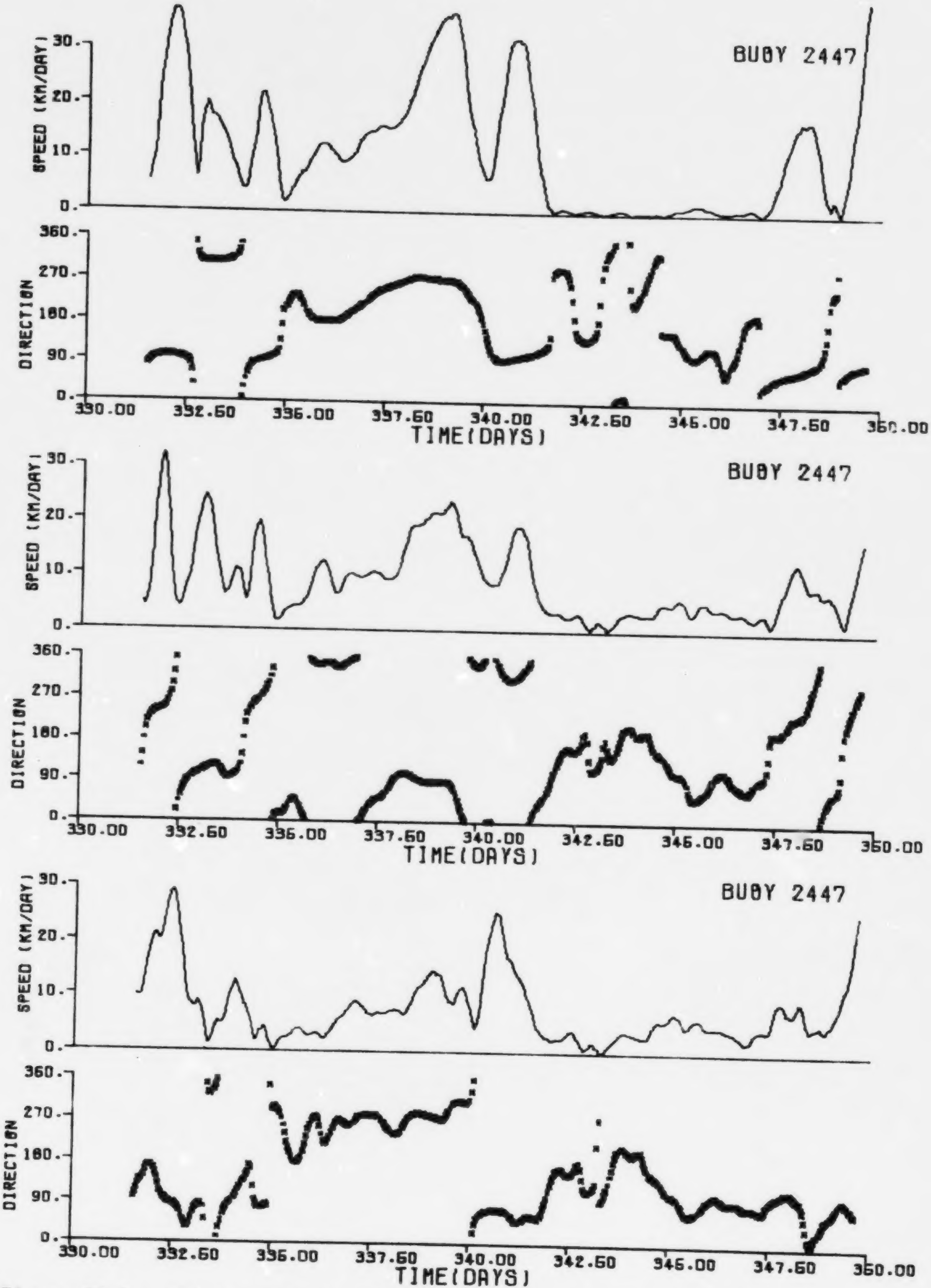


Figure A2-1. Sea-ice velocity (top), current velocity at 18 m relative to the ice (centre), and absolute current at 18 m (bottom).

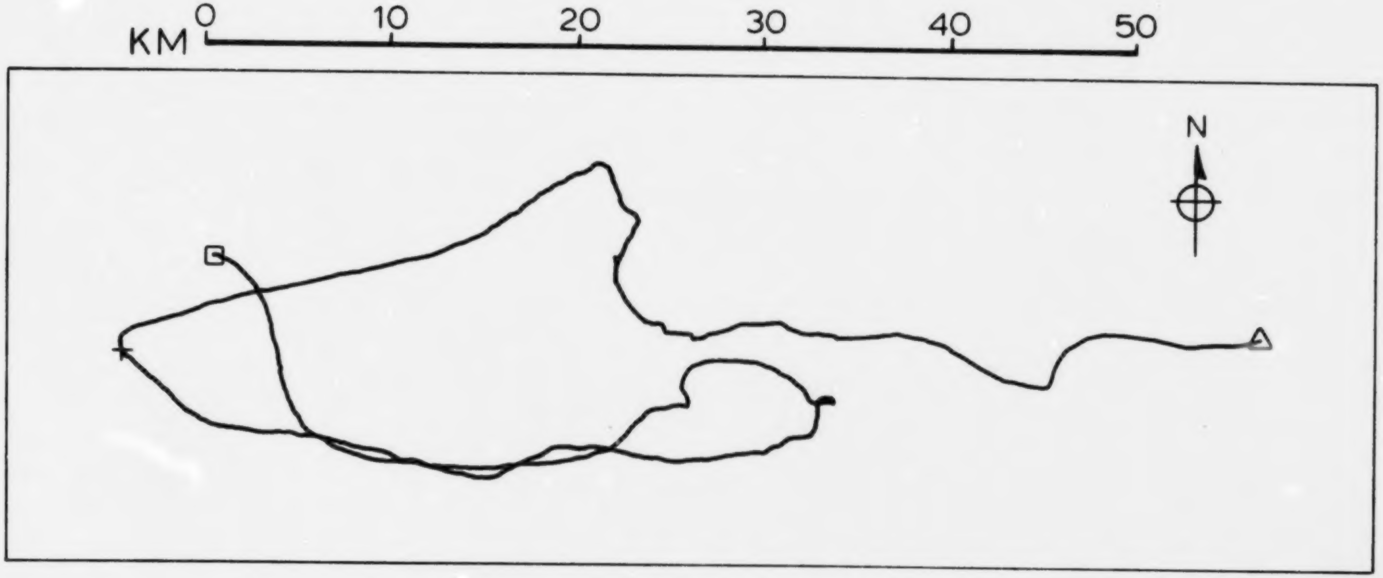


Figure A2-2. Progressive vector of current at 18 m in the vicinity of location 1 (Days 333-350, 1979).

Appendix 3

Ice-Buoy Drifts

Figure A3-1 displays the drift paths of the satellite-tracked ice buoys between their deployment and the end of 1979, or their demise whichever came first. The start of each track is marked with a square, and plus signs mark the positions at Days 340 (6 December), 350 (16 December), and 360 (26 December).

Figure A3-2 shows drift velocities for buoys 2447 (site 1), 2448 (site 2) and 2449 (site 6), and Figure A3-3 those for buoys 2450 (site 5) and 2451 (site 4).

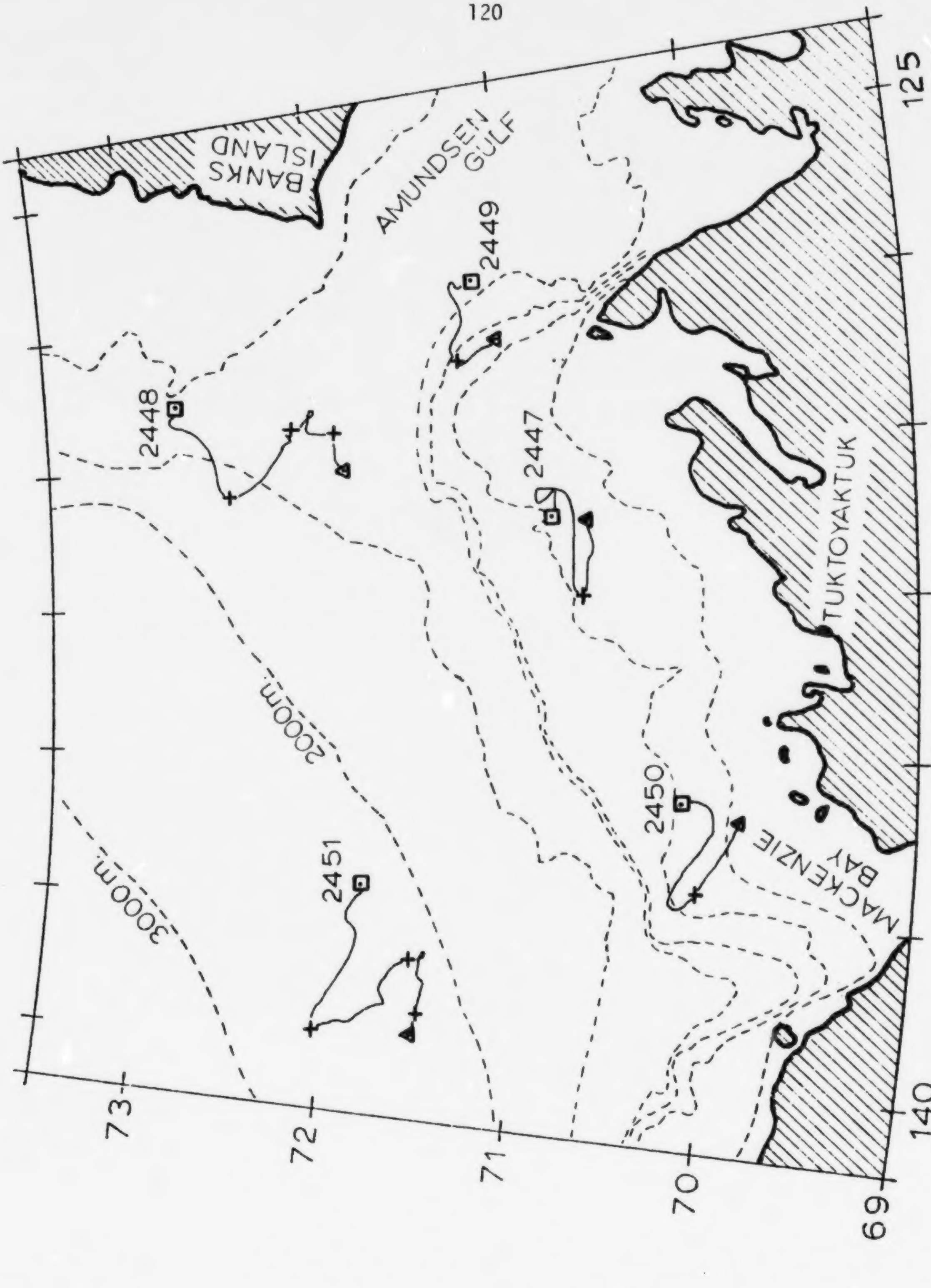


Figure A3-1. Drift paths of satellite-tracked ice buoys during November/ December 1979.

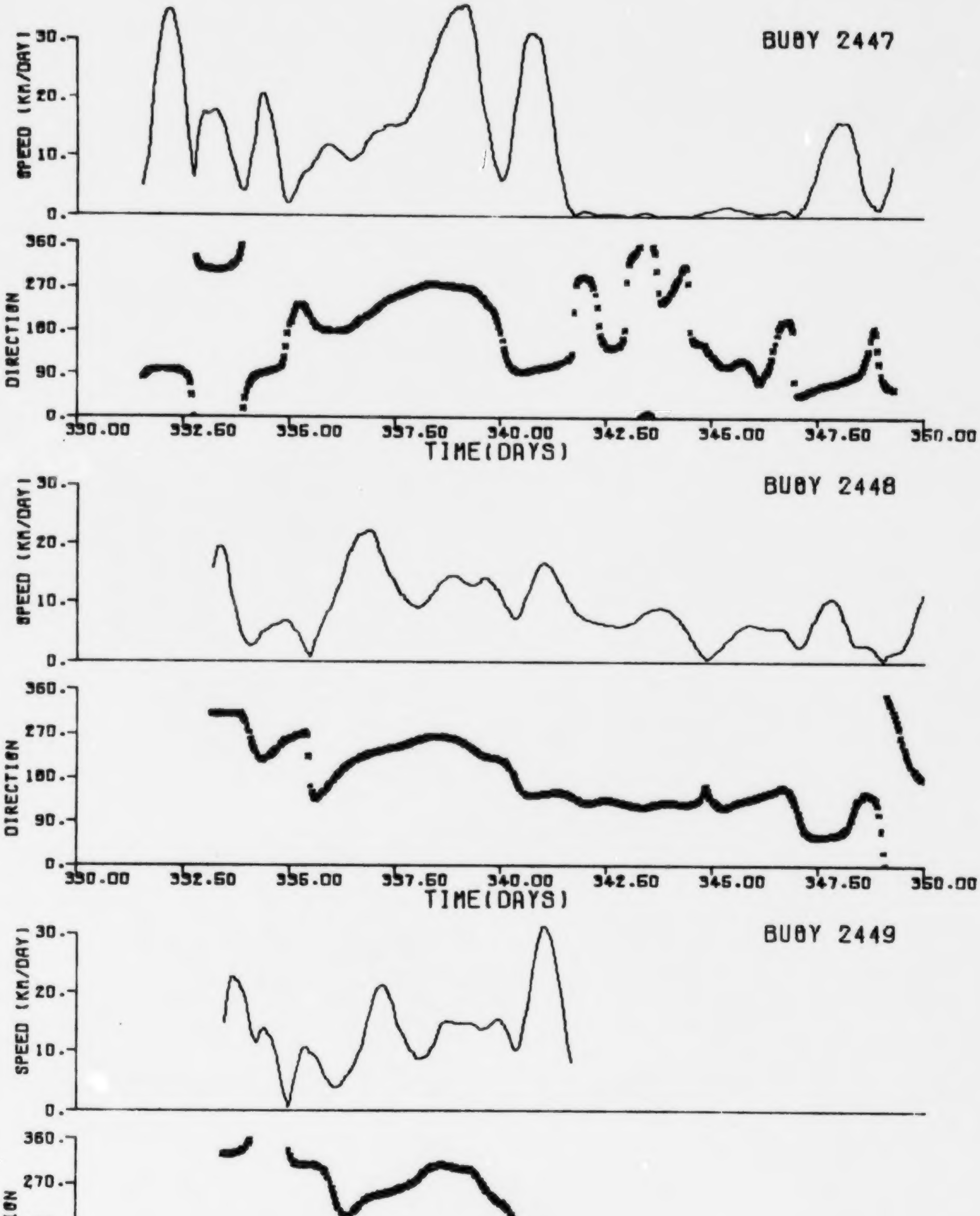


Figure A3-2a. Velocities of eastern buoys: 26 November - 15 December 1979.

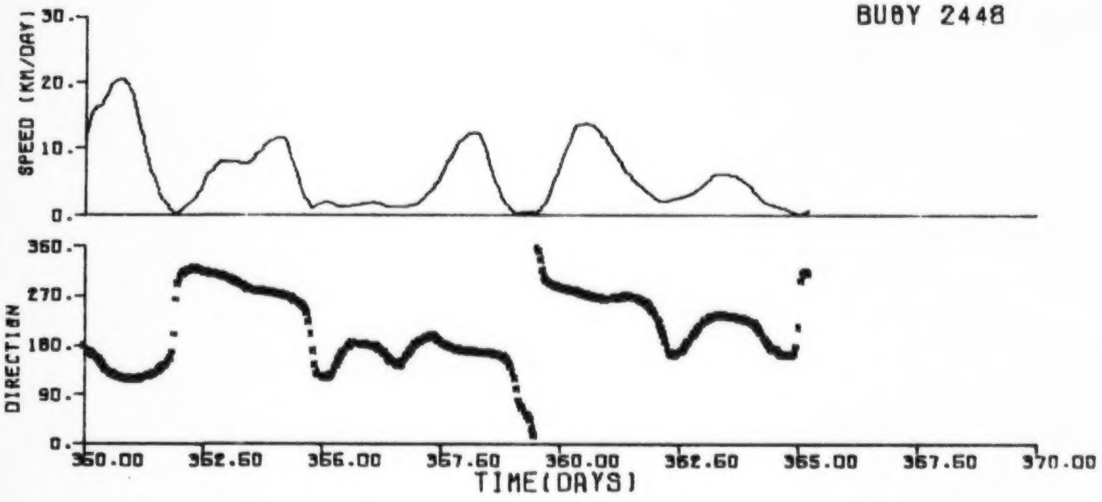
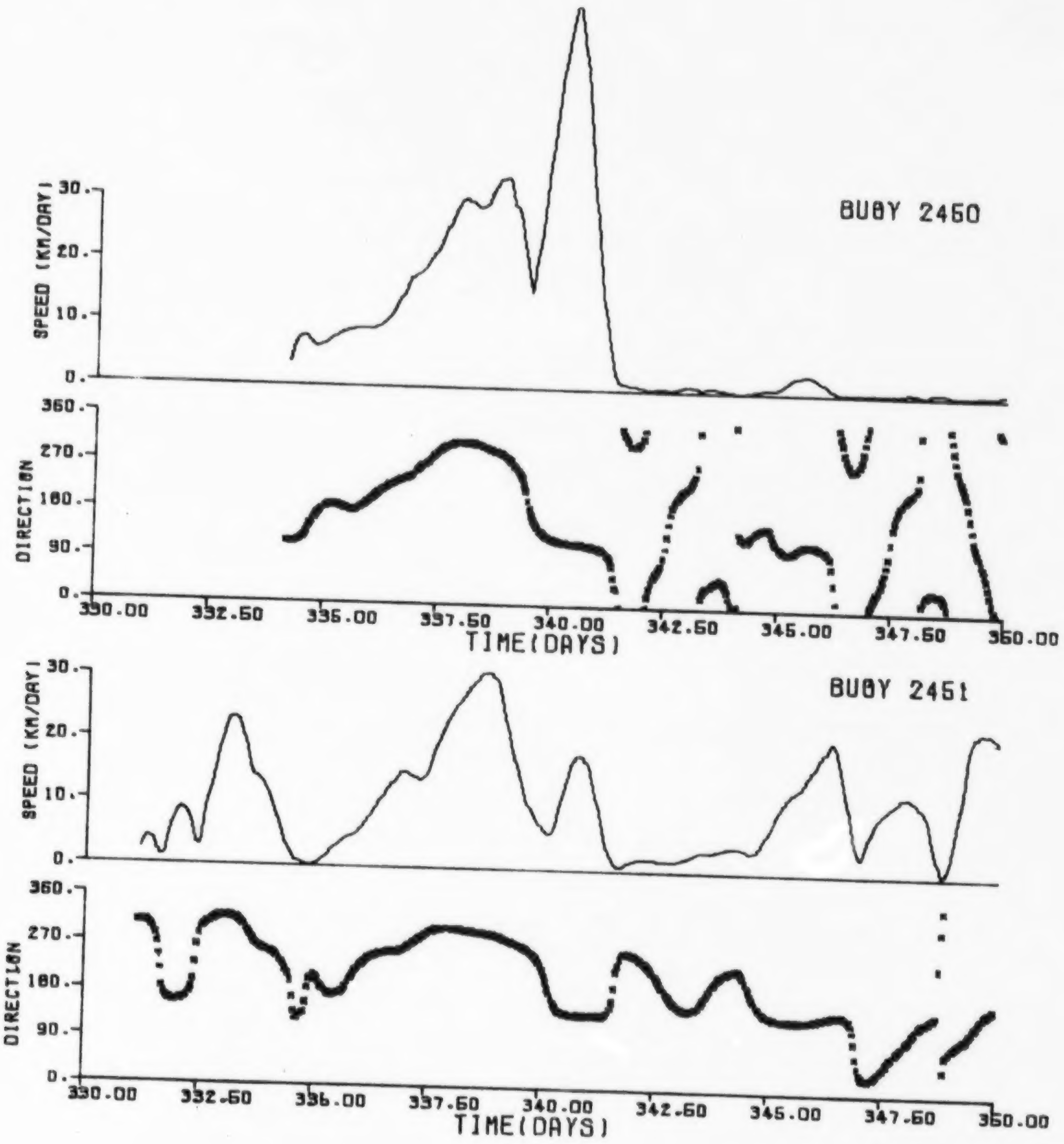


Figure A3-2b. Velocities of eastern buoys: 16 December - 04 January 1979.



A3-3a. Velocities of western buoys: 26 November - 15 December 1979.

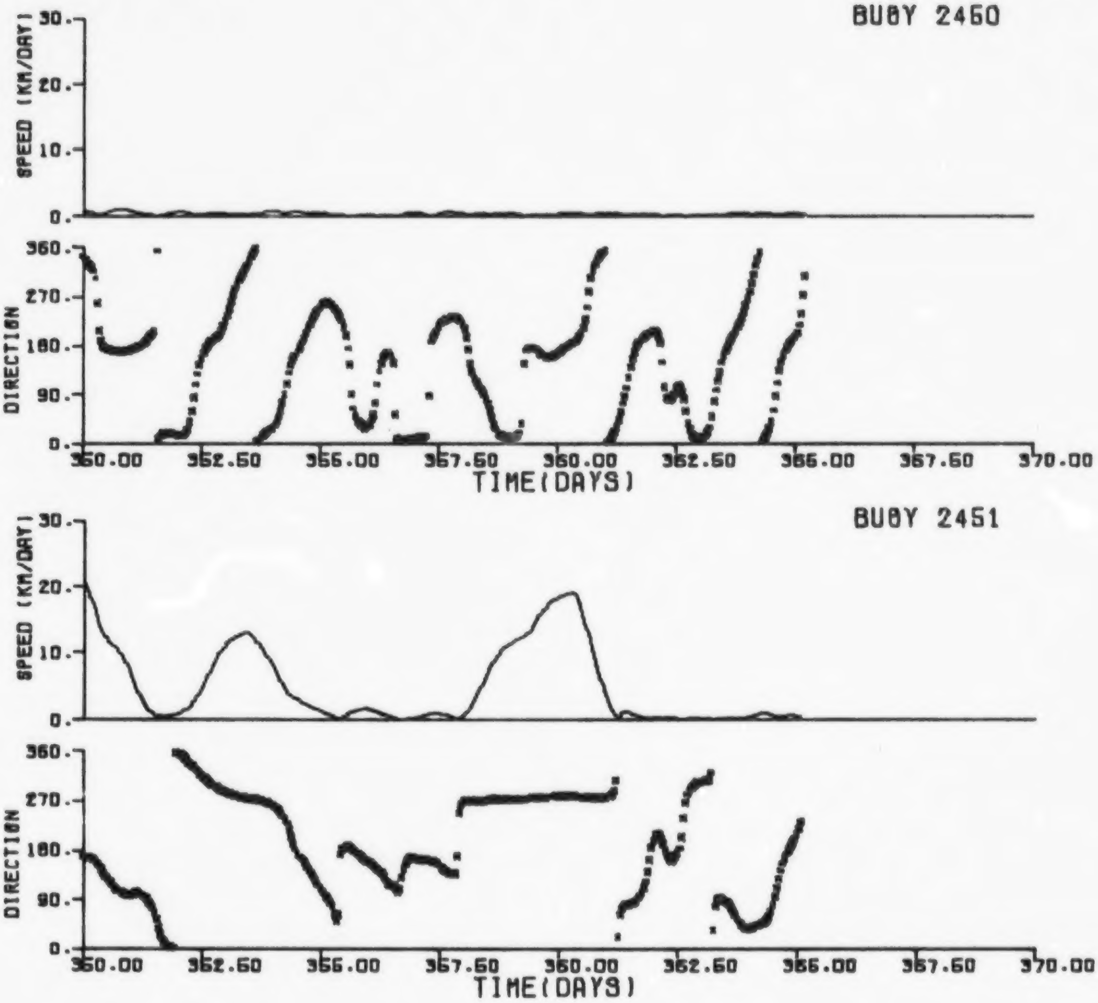


Figure A3-3b. Velocities of western buoys: 16 December - 04 January 1979.

Appendix 4

Snow Interface Temperatures

Extent : 11 sites (see Figure 2)
: 1-6 determinations per site.

Time : 26-29 November 1979.

Instrument : Platinum resistance thermometer; digital read-out.

Observers : FSRG, Canmar

Data : values of snow thickness, ice thickness and temperatures at the water-ice, ice-snow and snow-air interfaces.

Processing : averaging; simple quality check procedure.

Quality :

	Depth	Temperature
Precision	1 cm	~1°C
Accuracy	1 cm	>1°C

: variation of snow thickness at sites is considerable.
: hurried operations may have resulted in insufficient time for probe to reach environment temperature.
: effect of helicopter outwash (40 knots) is not known.
: different observers.

The measurement procedure was as follows:

1. Choose an arbitrary spot on the ice.
2. Cleanly shovel the snow away down to bare ice, leaving a vertical wall of snow at one side of the cut.
3. Measure the snow thickness with a tape measure.
4. Insert the probe horizontally along the ice-snow interface beneath the vertical wall of snow, and record the indicated temperature after it appears that further drift in the reading will be insignificant.
5. Lay the probe horizontally along the upper snow surface and record as in (4).
6. Move 10 paces in an arbitrary direction, and repeat 1 to 5. To choose 3rd and subsequent spots pace perpendicular to the preceding path, so that a zigzag pattern results.
7. Measure ice thickness at the hole bored for CTD measurements.
8. Use the temperature in the oceanic mixed layer measured by CTD to represent the ice-water interface temperature.

The accompanying table displays measurements at the indicated sites of the following parameters:

T_{wi}: temperature at the water-ice interface (°C)

T_{is}: temperature at the ice-snow interface (°C)

T_{sa}: temperature at the snow-air interface (°C)

h_s : snow thickness (m)

h_i : ice thickness (m); "R" indicates rafted ice.

Several derived parameters are also included:

$\Delta T_i/\Delta T = (T_{wi}-T_{is})/(T_{wi}-T_{sa})$: the fraction of the temperature difference between water and air felt across the ice.

h_s/h_i: the ratio of snow depth to ice thickness.

$(\Delta T_i/h_i)/(\Delta T_s/h_s)$: the ratio of the mean temperature gradient across the ice to that across snow.

A steady-state model of the water-ice-snow-air system suggests that $(\Delta T_i/h_i)/(\Delta T_s/h_s)$ should be constant at a given site and time and equal to the ratio of snow thermal conductivity to that of ice. Average values for each site are shown. This parameter provides a rough check on the quality of the data, and suggests that some data from sites 7 and 9 may be suspect.

TABLE A4

ICE INTERFACE TEMPERATURES

November 1979.

	T_{wi}	T_{is}	T_{sa}	$\Delta T_i/\Delta T$	h_s	h_i	h_s/h_i	$\frac{\Delta T_i}{h_i} / \frac{\Delta T_s}{h_s}$
Site 1 70°50'W 131°00'W 27 Nov 0300 GMT	-1.8	-9.0	-13.5	0.62	0.05	0.33	0.15	0.24
		-7.5	-13.6	0.48	0.07		0.21	0.20
		-9.3	-13.5	0.64	0.06		0.18	0.32
		-8.3	-13.1	0.58	0.06		0.18	0.25
								0.25
Site 2 72°54'N 128°53'W 27 Nov 2100 GMT	-1.7	-8.8	-13.7	0.59	0.04	0.50	0.08	0.12
		-7.8	-14.5	0.48	0.08		0.16	0.15
		-9.6	-12.8	0.71	0.03		0.06	0.15
		-7.7	-12.7	0.55	0.05		0.10	0.12
		-7.6	-11.7	0.59	0.05		0.10	0.14
								0.14
Site 3 72°10'N 132°30'W 28 Nov 2100 GMT	-1.7	-7.9	-14.3	0.49	0.09	0.56	0.16	0.16
		-11.7	-15.0	0.75	0.07		0.13	0.38
								0.27
Site 4 71°50'N 137°15'W 26 Nov 1900 GMT	-1.7	-6.1	-15.0	0.33	0.20	0.40	0.50	0.25
		-8.1		0.48	0.17		0.43	0.39
		-8.4	-15.3	0.49	0.08		0.20	0.19
		-9.8	-15.2	0.60	0.08		0.20	0.30
								0.28
Site 5 70°08'N 135°38'N 30 Nov 0100	-1.7	-5.7	-6.6	0.82	0.02	0.35	0.07	0.32
		-5.9	-7.1	0.78	0.02		0.07	0.25
		-4.9	-7.1	0.59	0.05		0.14	0.21
		-5.8	-6.3	0.89	0.02		0.07	0.59
		-5.6	-6.3	0.85	0.01		0.03	0.19
								0.31
Site 6 71°07'N 126°41'W 29 Nov 0600 GMT	-1.7	-9.5	-9.5	1.00	0.01	0.85R	0.01	
		-6.3	-9.3	0.61	0.15		0.18	0.27
		-6.3	-9.6	0.58	0.10		0.12	0.16
		-4.7	-9.3	0.39	0.23		0.27	0.18
		-5.6	-9.3	0.51	0.13		0.15	0.16
								0.19

Table A4 (continued)

	T_{wi}	T_{is}	T_{sa}	$\Delta T_i/\Delta T$	h_s	h_i	h_s/h_i	$\frac{\Delta T_i}{h_i} / \frac{\Delta T_s}{h_s}$
Site 7	-1.7	-7.1	-7.4	0.95	0.02	0.60R	0.04	0.75
72°00'N		-5.5	-7.8	0.62	0.02		0.04	0.07
127°20'W		-8.3	-8.4	0.99	0.02		0.04	2.75
29 Nov		-6.8	-8.1	0.87	0.05		0.08	0.33
0700 GMT		-7.5	-8.4	0.87	0.05		0.08	0.54
Site 8	-1.7	-11.8	-15.2	0.75	0.05	0.60R	0.08	0.25
71°25'N		-4.7	-15.6	0.22	0.20		0.33	0.09
133°20'W		-5.9	-14.1	0.34	0.15		0.25	0.13
27 Nov		-10.1	-13.7	0.70	0.05		0.08	0.19
0500 GMT		-9.8	-13.0	0.72	0.05		0.08	0.21
Site 9	-1.7	-8.5	-8.9	0.94	0.05	0.80R	0.06	1.06
71°27'N		-8.8	-8.9	0.99	0.02		0.03	2.22
130°22'N		-8.2	-8.9	0.90	0.10		0.13	1.16
29 Nov		-8.5	-8.9	0.94	0.02		0.03	0.53
0900 GMT		-6.8	-9.0	0.70	0.10		0.13	0.29
Site 10	-1.7	-10.8	-15.7	0.65	0.05	0.56	0.09	0.17
73°01'N								
134°52'W								
25 Nov								
2200 GMT								
Site 11	-1.7	-8.0	-12.8	0.57	0.12	0.35	0.34	0.45
71°00'N		-7.4	-12.9	0.51	0.14		0.40	0.41
136°20'W		-7.8	-13.1	0.54	0.13		0.37	0.43
26 Nov		-7.3	-12.5	0.52	0.13		0.37	0.40
2100 GMT		-7.3	-11.9	0.55	0.12		0.34	0.42
		-8.3	-13.0	0.58	0.12		0.34	0.48
								$\overline{0.43}$

Appendix 5

Baroclinic Shear Vectors for the RIM Grid

Vectors representing baroclinic shear of the surface (0db) relative to 400 db were computed from the dynamic topography at points corresponding to the grid of the Regional Ice Model (Neralla et al., 1981). Vectors and grid points are depicted in Figure A5-1, while Table A5-1 lists speed (cm/s) and direction (degrees clockwise from y-axis).

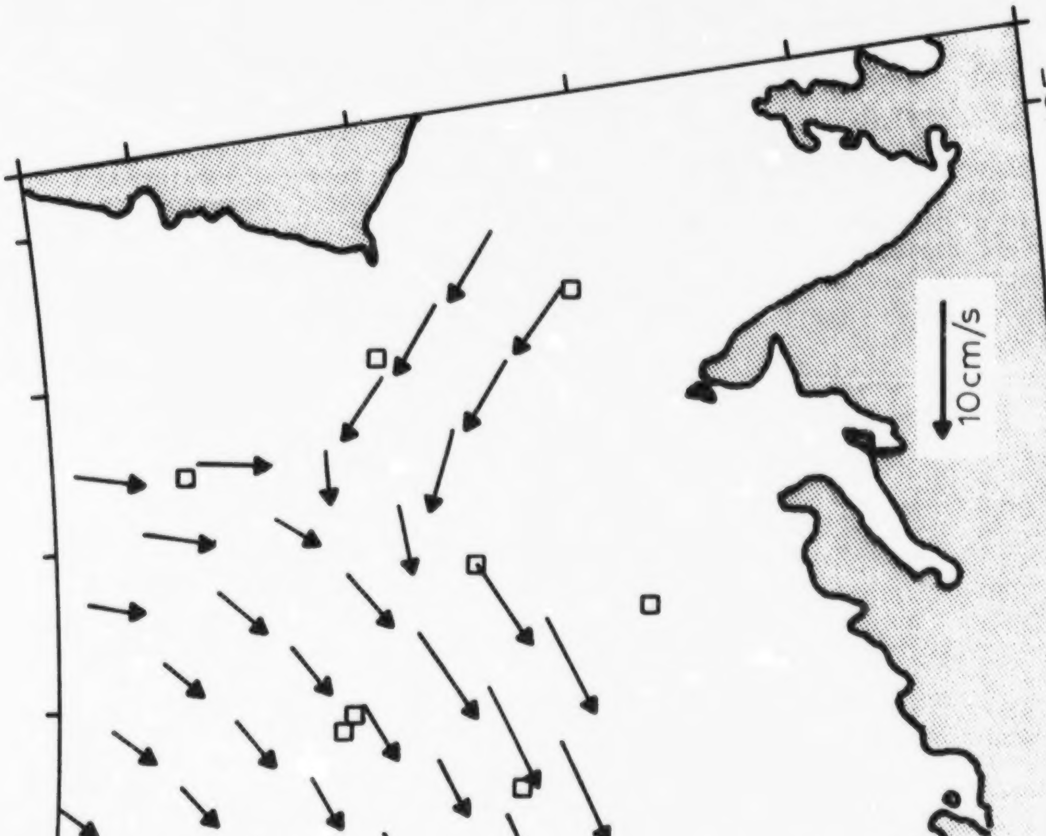


Figure A5-1. Baroclinic current vectors (0/400db). The vector tails occupy grid points of the Regional Ice Model. Grid axes are aligned as shown at upper left.

TABLE A5-1

Baroclinic Vectors on the RIM Grid

	Column Number									
	6	7	8	9	10	11	12	13	14	15
18				5.6 150	5.6 154					
17				4.8 156	5.6 160	5.6 150				
16		4.0 170	4.1 175	4.6 180	5.0 176	4.0 172	4.3 230	6.3 274	6.3 270	6.3 270
15		4.2 187	4.3 187	4.6 187	5.0 187	5.9 187	5.6 215	6.3 254	6.3 262	6.3 270
14		4.4 200	4.5 200	4.7 199	5.0 198	8.2 196	8.2 196			
13		4.6 203	4.6 203	5.0 203	5.0 202	8.6 202	8.6 201			
12	4.7 206	4.8 207	4.8 207	5.0 206	6.4 206	8.6 204				
11	4.7 211	4.8 211	5.1 211	5.0 209	8.6 209					
10	5.1 215	5.2 215	5.2 213	6.4 213	8.6 210					
9		5.5 220	6.4 218	7.7 212						
8		6.4 240	7.2 225	7.2 210						
7		7.5 253	7.3 243							